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THE USE OF FLUORINE IN THE PREVENTION OF DENTAL CARIES

II. EFFECT OF SODIUM FLUORIDE APPLICATIONS

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IN two previous papers, [1, 2] the available information touching on the action of fluorine in preventing dental caries was analyzed, and the conclusion was reached that the caries-preventing effect of fluorine is principally the result of a direct reaction between the external surfaces of the erupted teeth and fluorides in the drinking water or food. In these papers, it is suggested that the fluorine content of the teeth and their consequent resistance to caries could be increased by bringing them in contact with solutions of fluorides or other fluorine-containing preparations. If actual clinical test proved that this was the case, not only would convincing proof of our conclusion on the mode of action of fluorine be provided, but also a new and important approach to caries prevention could be established. For these reasons, it became important to make a clinical study of the effect of applications of fluoride on the activity of dental caries.

STUDY GROUP

Through the assistance of Dr. Florence Hopkins, of the Dental Unit of the Massachusetts Department of Health, and Mr. John Miller, then superintendent of the Brockton Schools, it became possible to carry out a study on the children attending Brockton Schools and to use the facilities of the school dental clinic. Because more new caries appears immediately after the eruption of the second molars, cuspid and bicuspids, and because the appearance of these teeth provides a new "caries-susceptible population" in the mouth, children from 10 to 13 years of age were chosen as most likely to reveal any caries-preventing effects from our treatments. A group of 100 children in this age group were selected by Miss Marie Blake, dental hygienist in the Brockton Schools, on the basis of willingness to cooperate, parental consent and, when there was one, the approval of the family dentist. At the beginning of the experiment, the age distribution of children was as follows: 10 to 10.5 years, 15; 10.5 to 11 years, 10; 11 to 11.5 years, 21; 11.5 to 12 years, 15; 12 to 12.5 years, 12; 12.5 to 13 years, 3; 13 years, 4. The group was of mixed racial and national background, nineteen claiming American parentage,

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fourteen Italian, eleven Irish, ten French, seven Syrian, three Swedish, three Lithuanian and two Polish, with single representatives of other groups or national mixtures.

Most of the children were receiving regular dental treatment at the school clinic, but some were ineligible, others would not submit to dental care and a few had their own dentists. The state of the teeth was not considered in choosing the experimental group. The children evidenced considerable variation in caries-susceptibility, three showing complete absence of caries and two having cavities or fillings in virtually every existing tooth. The remainder had between one and five affected permanent teeth. The usual variations in physique and health manifested themselves, but an unexpectedly high percentage showed microscopic hypoplasia of the teeth (Mellanby) or other signs of malnutrition. Largely as a result of changing conditions associated with defense employment, a number of children were lost during the period of the study. Ninety of the original 100 children were examined at the end of the first year, and only eighty were available at the end of the two-year study.

TABLE 1.—CARIES INCREASE BETWEEN FIRST AND SECOND EXAMINATIONS

No. of Patients Reporting for Both Examinations	Fluoride Treated Quadrants					Untreated Control Quadrants				
	First Examination			Reexamination		First Examination			Reexamination	
	Quadrant	No. of Teeth	No. of Affected Surfaces	New Caries	Questionable Change	Quadrant	No. of Teeth	No. of Affected Surfaces	New Caries	Questionable Change
27	UR	144	69	7	16	UL	145	69	21	17
17	LR	100	32	8	11	LL	97	29	12	21
24	UL	139	74	8	19	UR	139	88	13	21
22	LL	117	37	10	16	LR	115	38	15	17
90		500	212	33	62		496	224	61	76

TABLE 2.—CARIES INCREASE BETWEEN FIRST AND THIRD EXAMINATIONS

No. of Patients Reporting for Both Examinations	Fluoride Treated Quadrants					Untreated Control Quadrants				
	First Examination			Third Examination		First Examination			Third Examination	
	Quadrant	No. of Teeth	No. of Affected Surfaces	New Caries	Questionable Change	Quadrant	No. of Teeth	No. of Affected Surfaces	New Caries	Questionable Change
24	UR	132	56	21	34	UL	133	54	46	31
17	LR	100	41	14	15	LL	97	40	15	30
21	UL	133	51	22	26	UR	133	64	40	29
18	LL	99	52	26	15	LR	97	41	23	25
80		464	200	83	90		460	199	124	115

FLUORIDE TREATMENTS

Fluoride treatments were given in only one quadrant of each mouth. Different quadrants were selected and treated in different patients, so that an approximately equal number of each quadrant

(upper left, lower left, upper right or lower right) were used for test purposes. The quadrant on the opposite side of the same jaw was used as a control. Because laboratory study had shown that 1/1,000 sodium fluoride solution was almost as effective in reducing the solubility of enamel and dentin as were higher concentrations, an aqueous solution of this strength was chosen for use in the mouth. A routine dental prophylaxis with pumice and peroxide was given by the dental hygienist to all the teeth in the mouth from two to twenty-four hours before the fluoride treatment was given.

The procedure employed was as follows: Both the test and control quadrants were swabbed with hydrogen peroxide to remove any adherent débris and, as far as possible, to clean out tooth crevices and interproximal spaces. The mouth was then washed out with water. The test side was isolated with cotton rolls and the surfaces of the teeth were dried with cotton swabs, alcohol and air. Thereafter, all surfaces of the controlled teeth were kept wet with the 1/1,000 sodium fluoride solution for seven or eight minutes by means of repeated applications of the solution on cotton wool. In some instances, the fluoride solution was worked into tooth fissures by means of an explorer. On completion of treatment, the excess fluoride was removed with the absorbent roll or cotton swabs and the mouth thoroughly rinsed with water. Treatments of this sort were given at intervals of approximately four months during the period of the study, and thus each patient received six treatments prior to the final examination.

TABLE 3.—CARIES INCREMENT DURING TWO YEARS OF FLUORINE THERAPY

Test Period	Number of Children Completing Period of Study	Test Quadrants			Control Quadrants		
		New Caries	Questionable Change	Total Caries Increase	New Caries	Questionable Change	Total Caries
1 year	90	32	69	101	59	82	141
2 years	80	83	90	173	124	115	239

TABLE 4.—CARIES INCREASE IN VARIOUS TEETH IN EIGHTY PATIENTS

Tooth Group	Procedure	New Caries	Questionable Change	Total Caries	Percentage Reduction
Incisors and Cuspids	Test	12	14	26	26
	Control	23	12	35	
Bicuspids	Test	12	18	30	25
	Control	14	26	40	
Molars	Test	59	58	117	29
	Control	87	77	164	

CARIES EXAMINATION

The amount of caries in each mouth was determined by means of a mirror and probe. Graphic recordings were made of each tooth, showing the extent of the caries present and the size and

location of any fillings. Extracted, unerupted or erupting teeth were recorded as such. As in all examinations of this kind, many areas were found that could not be definitely called either carious or caries-free. Such areas were listed separately under "questionable change." The second examination was made after a period of one year, immediately before the fourth fluoride treatment. The third examination was carried out after a two-year period, at the termination of the experiment. Changes in the condition of the teeth were observed for each patient

surfaces that were carious in the corresponding control quadrants, and seventy-six caries-free surfaces in the control quadrants that were carious on the test side. In view of the normal symmetry of the attack of caries, this may be taken to indicate that there would be a slightly greater predisposition to caries in the test as compared with the control quadrants.

RESULTS OF FLUORIDE TREATMENTS

The results of the examination of the ninety patients who completed the first

TABLE 5.—LOCATION OF NEW CARIES AND QUESTIONABLE AREAS

	Total for Teeth		Percentage of Total Occurring in Different Locations											
			Occlusal		Mesial and Distal		Buccal		Lingual		Bucco-gingival		Linguo-gingival	
	New	Questionable	New	Questionable	New	Questionable	New	Questionable	New	Questionable	New	Questionable	New	Questionable
Molars														
Treated	59	58	61	71	17	10	10	7	0	3	3	9	8	0
Control	87	77	59	68	16	9	8	16	5	0	7	6	6	1
Bicuspids														
Treated	12	18	50	67	50	28	0	0	0	0	0	6	0	0
Control	14	26	50	65	43	26	0	0	8	0	0	8	0	0
Incisors and Cuspids														
Treated	12	14	0	0	100	93	0	0	0	7	0	0	0	0
Control	23	12	0	0	92	92	0	8	4	0	4	0	0	0

showing any new caries or questionable changes on previously intact tooth surfaces, increases in the size of existing cavities and new fillings placed in areas previously recorded as sound. In the original examination, the amount of caries in the test and control quadrants was about the same, the test quadrants having 212 affected surfaces that were carious and the corresponding controls on the other side, 224. In the test quadrants, there were ninety-one caries-free

year and the eighty who completed the second year of treatment are given in Tables 1 and 2. In these tables, questionable new caries, areas previously caries-free that had been filled and cavities that had shown a definite increase in size are grouped under "questionable change." The increases in caries during the first year and during the two-year period are summarized in Table 3. The three tables show that the caries increase in the quadrants treated with sodium

fluoride is considerably less than that in the untreated or control quadrants. At the termination of the study, the former showed an increase of 173 definite and questionable cavities as compared with 239 in the latter. The striking aspect of the findings is that the greatest reduction was in the new caries. Over the two-year period, there were only eighty-three definite new cavities in the treated, as compared with 124 in the control, quadrants. During the first year, the relative decrease in new caries was even more marked. Table 4 shows that the action of fluorides was effective on all types of teeth. Clinical observations seemed to indicate that the fluoride applications were particularly effective in controlling smooth surface caries, especially that occurring about the gingival margins in very susceptible patients. However, Table 5, which compares the caries-reducing effect on different surfaces of the teeth, does not offer any support for this impression.

DISCUSSION

The findings just presented offer definite proof that the activity of caries can be reduced by application of sodium fluoride to the surfaces of the teeth. Thus, support is given to our previously stated conclusion[1, 2] that fluorine acts to prevent caries principally by combining directly with the enamel surface to increase its resistance to the action of acid. More important than this is the possible bearing of these findings on the prevention of dental decay. The fact that such a marked reduction in caries can be produced by as few as three treatments[3] with the fluoride solutions indicates the great potentialities of fluorine-containing reagents in the field of preventive dentistry. It seems obvious that if infrequent treatment can cause such definite changes in the progress of caries, more frequent treatment, the use of improved technics of application or treatment using a more active fluorine reagent might accomplish a great deal more in the control of dental decay. Even if the results obtained in these experiments are not improved upon, an important practical step toward caries prevention has been made.

Topical application of fluorides to the teeth represents only one of many ways in which fluorine therapy could be used to prevent dental decay. An earlier paper[2] mentions a number of other possibilities, some of which are already on trial. Because improvements in methods of fluoride therapy will come only with time and continued experiment, there is a question as to how long dentists should wait before they put fluoride treatment into general use for caries prophylaxis. There is little doubt that if this procedure is not utilized fairly quickly by the dental profession, it will be presented to the public by other agencies. Provided suitable precautions are taken to prevent the swallowing of fluoride solutions, there seems to be no reason why dentists should not begin to use fluoride treatments of the sort described above on the teeth of caries-susceptible patients. Largent[4] has indicated that such sodium fluoride treatments "can be carried out without appreciable systemic absorption of the material."

SUMMARY

Experiments on eighty children over a period of two years showed that six topical application of a 1/1,000 sodium fluoride solution reduced dental caries by somewhat more than one-third as compared with results in the corresponding untreated quadrants in the same mouth.

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A STUDY OF THE OCCURRENCE AND TREATMENT OF DENTAL CARIES AMONG SCHOOL CHILDREN AGED 6-18 IN THE UNITED STATES*

At the meeting of the American College of Dentists in Houston, Texas, October 26, 1941, a committee was appointed to study possible plans to provide protective dentistry for American children. The committee submits this report.

It is important that a way be devised to prevent recurrence, in the next generation of young adults, of dental conditions similar to those indicated in recent Selective Service data, which show that approximately 8 per cent of young American men were dentally crippled to so great an extent that they were unfit for military service. We may safely conclude, on the basis of other large scale studies,[1, 2] that dental conditions among young American women are equally bad. It is not necessary to remind members of the dental profession that these conditions are avoidable, i.e., that if the men concerned had received proper dental care during childhood, there would have been practically no draft rejections for dental reasons.

The dental deficiency of American youth constitutes an obvious and immediate challenge to both the dental profession and the public: to dentistry because the members of the profession have the only available means to alleviate dental ill health; to the public because the public must pay for this service. It is the obligation of our profession to evolve plans to meet this challenge. Plans to solve the dental health problem, which is national in scope, will require the backing of the dental profession on a national scale.

*Report of a subcommittee of the Committee on Dental Research of the American College of Dentists to study plans for national dental health care.

THE PROBLEM

The total dental population of the United States is approximately 118,500,000 (persons aged 2 to 65 years inclusive). Of this number, about 30,000,000 are children of school age (6 to 18 years inclusive). Among the nation's school children, the caries attack rate, as shown by various studies,[3, 4, 5, 6] is between nine-twelfths and eleven-twelfths of a tooth per child per year. Caries is, of course, the major dental disease of school children. Dental research has as yet found no way to prevent caries. The only satisfactory method of combating the disease is to fill affected teeth during the early stages of decay. Unless this is done, the teeth attacked by caries will be lost in almost every instance. Thus, the logical present method of meeting the dental health need of school children is to fill all carious permanent teeth.

Why do we specify school children and permanent teeth? Because the whole problem of meeting dental health needs is one of such magnitude that neither the personnel nor the funds are available to solve it at present on a national scale. It is therefore necessary to limit any proposed plan to make it practical. The limitations here suggested are based on the following facts: 1. School children constitute the population group most easily available for dental exam-

ination and treatment on a large scale. 2. Dental caries is primarily a disease of childhood. 3. Dentistry's most important single task is the preservation of the permanent teeth. These stated limitations are not intended to suggest that we regard as unimportant the care of adults' teeth or of children's deciduous teeth or the treatment of malocclusion. The committee fully realizes that care for expectant mothers and postnatal care for children of preschool age are of great importance in a comprehensive dental health program; but the problems associated therewith are different from those involved in dental care for the school age population and require close cooperation with other services. Therefore, the committee proposes that a separate program be devised for protective dentistry for preschool children.

Are there enough dentists to provide dental care for 30,000,000 school children, as well as to take care of the needs of other groups? The total number of dentists in the United States in peace time (1940) was approximately 75,000, or one dentist to each 1,600 persons in the total dental population. These dentists can, of course, give only a portion of their time to the filling of school children's teeth. Would the dentists' time schedule permit operation of a program which called for the filling of the carious permanent teeth in all children aged 6 to 18 years inclusive? Figures now available indicate that it would, if there were an equal distribution of dentists throughout the whole country.

Even if the caries attack rate is as high as one tooth per child per year (it is in all likelihood somewhat less), and if the filling of a permanent tooth requires a full hour of the dentist's time (it usually requires less), the time required to fill all the cavities for all the school children in the United States would be approximately 30,000,000 service hours per year, or approximately 400 hours per year for each dentist. Allowing, on a very conservative basis, a working week of only thirty-seven hours and a working year of only forty-eight weeks, each dentist represents 1,776 potential service hours a year. The hours alloted to school children amount to approximately 22 per cent of this time, and the children represent approximately 26 per cent of the total dental population. Thus, the distribution of the dentists' time would be in favorable proportion to the needs of patients of this age group.

What would be the cost of providing fillings for the teeth of all school children, on the basis of one filling per child per year? Considering average fees charged by dentists for fillings, it may be safely assumed that the average cost of keeping school children's teeth in good repair would be approximately $4 a year (a fee selected for purposes of illustration), or a total of $48 for the twelve years of the school period. In other words, the children's filling needs could be met for that amount if their carious teeth were filled each year. If their teeth continued to be neglected, however, the cost of providing needed replacements would be greatly in excess of that sum.

The facts concerning the dental needs of American children may be briefly summed up as follows: There are approximately 30,000,000 children of school age in the country. The average child acquires less than one carious cavity per year in permanent teeth between the ages of 6 and 18 years. The child's dental needs consist mainly of fillings for these carious teeth. These needs could be taken care of in approximately one hour of dental-service time per child per year, and that service could be adequately provided at the approximate rate of $4 per child per year.

SUGGESTED PROGRAM

With these facts in mind, we are in a position to suggest a program to care

for the dental needs of school children. This program would aim mainly to provide fillings for the permanent teeth of school children, starting at age 6, and also for deciduous teeth of the same children when indicated.

During the first year of operation of the program, the dental needs of all 6-year-old children (or all first graders in the schools) would be met. These children would begin their second school year with all dental defects corrected. After that, only the new defects arising each year in this group would need to be cared for. There would be no accumulated backlog of defects, such as exists at present among American children and young people. During the second year of the program, a new group of 6-year-olds would receive complete care, and any new defects in the original group of 6-year-olds would be treated. Thus, there would be no backlog of dental defects in these two groups. If this dental-health program was conducted to include (cumulatively) additional age classes in the 6-18 year indigent group, by the procedure indicated in the supplement to this report (Table 3), the backlog for that group would be eliminated in seven years after initiation of the plan; all indigent children aged 6 to 18 years would then be receiving full protective dental service, and, thereafter, the project would be an endeavor to maintain dental health in the 6-18 year group of indigents without development of a backlog of untreated carious cavities.

Of course, a start made even at age 6 is too late to take adequate care of defects in some of the deciduous teeth. To be really effective and most economical, routine dental care should begin at age 2, or as soon as all deciduous teeth are in place. Hence it is eminently desirable that a dental health program for preschool children be worked out, as suggested earlier in this report.

Even in a program restricted to the dental care of school-age children, fillings for deciduous teeth that should be retained for some time, extraction of abscessed teeth, x-ray examinations, prophylaxis or treatment for accident cases would be needed in some instances. However, since we believe the estimate of one carious permanent tooth per child per year and the allowance of $4 and of one dental service hour per child per year are very liberal, it is probable that, on that basis, enough money and time would be available for these other needs.

Dental health education should be used to draw the attention of the public to the need for dental care and to motivate them to obtain such care. Educational material is now distributed, and presumably will continue to be distributed, by state health departments and other official and non-official agencies working in the interests of public dental health. Such material should place its main emphasis on the need for early and frequent dental care. The influence of such an educational program would be reflected in greater interest in protective care for the entire child population.

It has been estimated that 75 per cent of the population can pay for all or part of their own dental care.[7] If we assume that as many as one-third of the total number of school children, i.e., 10,000,000 children, would be unable to pay anything, we should need $4 for each child for the first year's program, or a total of $40,000,000. It is suggested that the federal government might allocate this amount, through action of the Congress of the United States, for care of the 10,000,000 indigent children who would need to be included under the program. This money could be most suitably and satisfactorily handled by the United States Public Health Service, which could administer the funds through the health departments of the states or through other approved agencies. It is suggested that states and local communities participating in the use of the federal funds provide the money that would be needed for their respective administrative purposes. There would thus be no need to

set up any new administrative bodies to conduct the program. It is also possible that sufficient state and local funds could be set aside to provide dental care for indigent children other than fillings for permanent teeth of those included in the suggested federal aid plan.

With this suggested program, dental work would be done only by dentists, in their own offices or in clinics, as conditions would indicate. The dentists' fees would be based on a schedule to be set up as part of the program. All participating dentists would be required to keep accurate records of work done, and to send duplicates of such records to the state health department or other official agency administering the program, before such agencies would pay the dentists' bills for care given indigent children. Such records would be invaluable for future research.

EDUCATION, RESEARCH, SERVICE

Objections may be made to the suggestion that so much public money be used "merely" to fill teeth. There may be counter proposals to put the money into an educational program or a program of dental research. The committee believes that the educational and research work now being carried on should, in every possible way, be supported, encouraged and expanded. The committee also feels that, through no fault of the educators or of the research workers, there is at present only one practical way to save teeth, and that is by the insertion of fillings before decay has advanced so far that destruction and loss of teeth are inevitable. We need to make full use of the means we have for saving teeth while continuing research into the causes and means of prevention of dental disease. If a practical preventive of caries were brought to light during the progress of a program of protective dentistry such as that suggested here, there would still be millions of cavities waiting to be filled —and we know that filling carious teeth does save them. We should not let teeth be lost while research seeks a better way of saving them.

Education of the public, too, must be continued and increased, but, as many leaders in both health and educational fields have recently emphasized, it is useless to tell people what they should do if they cannot do it. To tell indigent persons that early and frequent dental care is essential to save teeth and conserve dental health will not send them to the dentist, for they know that they cannot pay for the service. The present study suggests what seems to be the only feasible way to provide funds for that service for a large and important section of our population. Our suggestion is founded on the principle, accepted by the dental profession, that dental service is essential to the public welfare.

The problem presented by the present situation, and a suggested way to solve it, are summarized in this report. A supplementary report, prepared by Alan E. Treloar, concerning services that would be needed from the American dental profession in order to carry out the foregoing suggestions, is attached hereto. Dr. Treloar's report was compiled in accordance with instructions given to this committee at the annual meeting of the Board of Regents in St. Louis, in August 1942.

Respectfully submitted,

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Chairman.

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A SURVEY OF NEEDS AND SERVICES AVAILABLE FOR PROTECTIVE DENTISTRY FOR THE INDIGENT CHILDREN AND YOUTH IN THE U.S.A.*

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POPULATION FROM 6 TO 18 YEARS

EXACT determination of the number of persons by age in each state in this country is impossible. Although the national decennial census had this objective as one of many, demographers know well that the count so secured is only approximate even with respect to the total number of persons in the country as a whole. The enumeration is obviously erroneous in substantial degree when broken down into single year-of-age classes, and these errors are increased somewhat when the figures are segregated by states.

One may rationalize with confidence that, in a fairly large proportion of cases, the person reporting to the census enumerator either does not know precisely the age of each member of the household or is unwilling, for one cause or another (or not sufficiently interested), to give it correctly. Errors so introduced are not random. They do not balance one another in the statistical summary, for there is obvious "piling up" of persons in certain age classes. Generally speaking, the favored ages are the multiples of 10, the other even numbered ages and the odd multiples of 5. In the age range with which this report is concerned, it is clear that too few individuals are reported in the 7, 9, 11, 13 and 17 year classes (particularly 7 and 13), with excesses in the others (especially 10). These peculiarities of age preference are modified in degree by local customs and conditions. Resort to some "smoothing" process is therefore necessary to correct for the biases, the resultant figures being logically considered more reliable than the census enumerations.

Attempts to estimate state populations by age for dates following that of the last census (April 1, 1940) must contend with additional problems. It is necessary to take into account not only the intervening births and deaths, which are imperfectly recorded to varying degree in the several states, but also the interstate migrations which are not recorded as

*Supplement to "A Study of the Occurrence and Treatment of Dental Caries Among School Children in the United States, Aged 6-18."

Prepared in December 1942 for the estimated 1940 U.S.A. population by age and state of residence.

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such at all. These migrations in recent years have been extensive and have deviated far from the usual pattern of residence changes, as studies of the Ration Book applications amply attest. Some of this population movement may be expected to be reversed after the war. In view of all these factors, it seems idle to base this report on estimates for any more recent year than that of the last census. Indeed the ratio of the number of registered dentists to the population by states in 1940 was probably much more representative of "normal" conditions than in any more recent year. It therefore seems advisable, for the present purposes, to be content with a view of the situation as it was in 1940.

There is no need to detail herein the various extended maneuvers in which we engaged in an effort to estimate, as accurately as seemed necessary, the population by single years of age from 6 to 18 in each state for the last census date. At the time this study was made, the census reports by states were available only by the five-year age classes 0-4, 5-9, 10-14, etc. These had to be redistributed into single year-of-age classes. Calculation procedures for this purpose that had seemed valid for other census years were found to be unacceptable for 1940, for the peak of recorded population density had shifted from about 8 years of age in 1930 (and previous censuses) to above 15 years of age in 1940. In view of this important fact, the best way to estimate the single-year populations with fair prospect of success seemed to be to graph the recorded 1940 census figures by five-year bands, from birth to 25 years for each state, then attempt graduation of the resultant histograms by free-hand curves relying on personal judgment. In applying this procedure, we adhered to the following principles: (1) that each state total from 5 to 19 years, inclusive, should agree with the published figures for the 1940 census, and (2) that the total within each five-year age band should adhere at least as closely to the census figure as experience with the biased errors of age statement would seem to demand for each state. (The nature of these biases was studied in terms of the single-year age-distributions by states as recorded for the 1930 census.) No attempt was made to refine the single year estimates so secured beyond round numbers roughly within 1 per cent of the average census count.

Three main types of age distribution arose as a result of application of this method. In Massachusetts, there is a fairly steep progressive increase in number of persons in each year of age from 6 to 18, the maximum being reached around 20 years, with a decline thereafter. In Mississippi, the distribution rises slowly to a peak at about 12 years of age, falling thereafter. In New Mexico, the number of persons in each year of age falls sharply as age increases. Arizona is the only other state showing the New Mexico pattern, most states adhering to or falling between the Massachusetts and Mississippi forms, with modifications usually at one or both ends of the range.

The detailed estimated age distributions by single years from 6 to 18 are given by states and for the U.S.A. as a whole in Table 1. It is believed that these figures form reasonably accurate estimates of the true values so far as the needs of this report require. The error of estimate seems very likely to be substantially less than 5 per cent for any one year of age.

PROSPECTIVE NEW SERVICE LOAD FOR THE DENTAL PROFESSION

The number of registered dentists in each state for the year 1940 (or in certain states for 1941) has been kindly supplied by Melvin L. Dollar, secretary of the Committee on Economics of the American Dental Association.) These figures are given in the second column of Table 2. The total 6-18-year popu-

TABLE 1.—ESTIMATED POPULATIONS FROM 6 TO 18 YEARS AS OF APRIL 1, 1940

State	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	Total
Alabama	61,000	61,500	61,500	62,000	62,000	62,500	62,500	62,500	63,000	62,500	61,500	60,500	59,000	802,000
Arizona	10,300	10,200	10,200	10,100	10,100	10,000	10,000	9,900	9,800	9,800	9,700	9,700	9,500	129,300
Arkansas	40,000	40,000	40,500	40,500	40,500	41,000	41,000	41,500	41,500	41,500	41,500	41,000	41,000	531,500
California	87,000	87,000	87,000	88,000	90,000	93,000	96,000	98,000	101,000	104,000	107,000	109,000	111,000	1,258,000
Colorado	18,600	18,800	18,800	19,000	19,000	19,200	19,400	19,800	20,000	20,400	20,400	20,600	20,600	254,600
Connecticut	23,000	23,000	23,500	24,500	25,500	26,500	27,500	28,500	29,500	30,000	30,500	31,000	31,500	354,500
Delaware	3,900	3,950	4,000	4,050	4,100	4,150	4,250	4,350	4,450	4,550	4,650	4,650	4,700	55,750
District of Columbia	7,400	7,400	7,500	7,600	7,700	7,900	8,200	8,500	8,800	9,100	9,400	9,700	10,000	109,200
Florida	30,500	30,500	30,500	31,500	33,000	34,000	34,500	34,500	34,500	34,000	34,000	34,000	34,000	429,500
Georgia	63,500	64,000	64,000	64,500	64,500	64,500	65,000	65,000	65,500	65,500	66,000	66,000	66,000	844,000
Idaho	9,600	9,600	9,600	9,600	9,700	9,800	9,900	10,100	10,400	10,400	10,500	10,500	10,400	130,100
Illinois	108,000	108,000	109,000	111,000	116,000	120,000	124,000	127,000	130,000	132,000	133,000	135,000	136,000	1,589,000
Indiana	51,500	51,500	52,500	54,000	55,500	57,000	59,000	60,000	61,000	62,000	62,500	63,000	62,500	752,000
Iowa	39,500	40,000	40,000	40,500	41,000	42,000	43,500	44,500	45,500	46,000	46,500	47,000	46,500	562,500
Kansas	28,200	28,600	29,000	29,600	30,200	30,800	31,600	32,200	33,000	33,600	33,800	34,000	34,000	408,600
Kentucky	57,000	57,000	57,000	57,500	58,000	58,500	59,000	59,000	59,000	59,500	59,500	59,500	59,000	759,500
Louisiana	45,500	45,500	46,000	46,000	47,000	48,000	49,000	49,500	49,500	49,500	49,000	48,500	47,500	620,500
Maine	14,600	14,800	15,000	15,100	15,200	15,400	15,500	15,600	15,700	15,800	15,900	15,900	15,700	200,200
Maryland	27,600	28,000	28,600	29,400	30,000	30,600	31,200	31,800	32,600	33,000	33,400	33,800	33,800	403,800
Massachusetts	58,500	61,000	63,500	65,500	67,000	69,000	70,500	72,500	74,500	76,000	77,000	77,500	77,500	910,000
Michigan	83,000	83,000	84,000	86,000	89,000	91,000	93,000	95,000	96,000	96,000	96,000	96,000	95,000	1,183,000
Minnesota	43,500	43,500	44,000	45,000	46,000	47,000	48,000	48,500	49,500	50,500	51,500	52,000	52,000	621,000
Mississippi	47,000	47,000	47,500	48,000	48,000	48,500	48,500	48,500	48,000	47,500	47,000	46,000	45,000	616,500
Missouri	57,000	58,000	59,000	60,000	61,000	62,000	63,500	64,500	65,500	67,000	67,500	67,500	67,000	819,500
Montana	9,000	9,000	9,000	9,100	9,300	9,400	9,600	9,800	10,000	10,000	10,200	10,200	10,300	125,000
Nebraska	21,400	21,600	22,000	22,400	22,800	23,200	23,600	24,200	24,600	25,200	25,200	25,200	25,000	306,400
Nevada	1,580	1,580	1,560	1,560	1,560	1,560	1,580	1,580	1,600	1,620	1,640	1,660	1,700	20,780
New Hampshire	7,300	7,500	7,700	7,800	8,000	8,200	8,300	8,500	8,600	8,700	8,700	8,700	8,700	106,700
New Jersey	54,000	56,000	58,000	60,500	63,000	65,500	68,000	69,500	71,500	73,000	74,500	75,500	76,000	865,000
New Mexico	12,400	12,200	12,100	12,000	11,900	11,800	11,700	11,600	11,400	11,300	11,200	10,900	10,600	151,100
New York	174,000	178,000	184,000	190,000	198,000	204,000	210,000	214,000	218,000	222,000	224,000	224,000	226,000	2,666,000
North Carolina	77,000	77,000	77,000	78,000	78,000	79,000	80,000	81,000	82,000	83,000	83,000	82,000	80,000	1,037,000
North Dakota	12,300	12,400	12,600	12,800	13,000	13,200	13,300	13,400	13,500	13,500	13,500	13,300	13,000	169,800

	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	Total
Ohio	98,000	98,000	100,000	102,000	106,000	110,000	116,000	120,000	124,000	126,000	126,000	126,000	125,000	1,477,000
Oklahoma	45,000	45,500	46,000	46,000	46,500	47,000	47,500	47,500	48,000	48,500	49,000	49,000	48,500	614,000
Oregon	14,800	14,600	14,400	14,600	14,800	15,600	16,400	17,200	18,000	18,400	18,600	18,600	18,400	214,400
Pennsylvania	148,000	152,000	156,000	162,000	168,000	176,000	182,000	188,000	192,000	194,000	194,000	194,000	194,000	2,300,000
Rhode Island	9,800	10,100	10,400	10,800	11,200	11,600	12,100	12,600	13,100	13,500	13,800	13,800	13,700	156,500
South Carolina	43,000	43,000	43,000	43,000	43,000	43,000	43,000	43,000	43,500	44,500	45,500	45,500	45,000	568,000
South Dakota	11,600	11,700	11,800	11,900	12,000	12,200	12,400	12,600	12,800	12,900	13,000	13,100	13,100	161,100
Tennessee	56,500	57,000	57,000	57,500	58,000	58,500	58,500	59,000	59,500	60,000	60,000	60,000	59,500	761,000
Texas	118,000	119,000	120,000	121,000	123,000	124,000	125,000	126,000	128,000	128,000	128,000	128,000	127,000	1,615,000
Utah	11,300	11,300	11,200	11,300	11,300	11,400	11,500	11,700	11,800	11,900	11,900	11,800	11,600	150,000
Vermont	6,000	6,050	6,100	6,150	6,250	6,350	6,500	6,600	6,650	6,650	6,650	6,600	6,450	83,000
Virginia	50,000	50,500	51,000	52,000	52,500	53,500	54,000	54,500	55,500	56,000	57,000	57,000	57,000	700,500
Washington	23,200	23,200	23,400	23,800	24,200	24,800	25,400	26,200	27,000	28,000	29,000	29,600	30,000	337,800
West Virginia	38,000	38,000	38,500	39,000	39,500	40,500	41,000	42,000	42,500	42,500	42,500	42,000	40,500	526,500
Wisconsin	50,000	50,000	51,000	52,000	53,000	54,000	55,000	56,000	57,000	57,500	57,500	57,500	57,000	707,500
Wyoming	4,350	4,300	4,300	4,350	4,350	4,400	4,450	4,550	4,600	4,700	4,800	4,850	4,850	58,850
Total	2,112,230	2,131,380	2,160,260	2,200,510	2,249,160	2,301,060	2,351,380	2,392,280	2,433,400	2,461,620	2,476,940	2,481,160	2,472,100	30,223,480

lations by states, taken from Table 1, are also given as column 3 in Table 2. The derived ratio of 6-18-year population per registered dentist in each state is given in column 4 of Table 2. It will be observed from these ratios that the potential clinical load per dentist varies greatly from state to state—from 207 young persons per dentist in California to 1,843 such persons per dentist in New Mexico. The District of Columbia is distinguished by having a lower number of young people per dentist (165) than any state.

These measures of clinical load would not apply without some modification in a program of complete care of dental caries for all persons between 6 and 18 years in the various states. There is increasing evidence that the incidence of caries varies somewhat over the U.S.A., although critical evaluation of all available evidence is still much needed. In a program providing protective dentistry for only those not able to pay for such care, the factors of economic welfare must also play a large part, and these vary more or less widely by states. Satisfactory definition of the rôles to be played by these two factors differentiating the states is not available. Indeed, very considerable research is still necessary to evaluate their relative influences from one state to another.

On the basis of such rather extensive studies as have been made, it seems an acceptable generalization that the present incidence of dental caries, for persons between 6 and 18 years in the U.S.A. as a whole, approaches, but does not exceed, one tooth affected per person per year. This figure is closely approached in the northern states. The southern states seem to show a somewhat lower incidence. Because of the lack of completely adequate data, it seems advisable to accept the figure of one carious tooth per person per year between 6 and 18 as a basis for determining the maximum load to be antici-

TABLE 2.—ESTIMATES OF PROFESSIONAL LOAD AND COST

State	Number of Dentists	Persons, 6-18 Years		Needy, 6-18 Years		Necessary Funds
		Number	Number per Dentist	Number	Number per Dentist	
Alabama	634	802,000	1,265	267,333	422	$1,069,332
Arizona	142	129,300	911	43,100	304	172,400
Arkansas	378	531,500	1,406	177,167	469	708,668
California	6,077	1,258,000	207	419,333	69	1,677,332
Colorado	732	254,600	348	84,867	116	339,468
Connecticut	1,177	354,500	301	118,167	100	472,668
Delaware	101	55,750	552	18,583	184	74,332
District of Columbia	661	109,200	165	36,400	55	145,600
Florida	705	429,500	609	143,167	203	572,668
Georgia	662	844,000	1,275	281,333	425	1,125,332
Idaho	205	130,100	635	43,367	212	173,468
Illinois	6,435*	1,589,000	247	529,667	82	2,118,668
Indiana	1,933	752,000	389	250,667	130	1,002,668
Iowa	1,808	562,500	311	187,500	104	750,000
Kansas	1,020	408,600	401	136,200	134	544,800
Kentucky	881	759,500	862	253,167	287	1,012,668
Louisiana	879	620,500	706	206,833	235	827,332
Maine	396	200,200	506	66,733	169	266,932
Maryland	832	403,800	485	134,600	162	538,400
Massachusetts	3,408	910,000	267	303,333	89	1,213,332
Michigan	2,978	1,183,000	397	394,333	132	1,577,332
Minnesota	2,311	621,000	269	207,000	90	828,000
Mississippi	404	616,500	1,526	205,500	509	822,000
Missouri	2,629*	819,500	312	273,167	104	1,092,668
Montana	307*	125,000	407	41,667	136	166,668
Nebraska	942	306,400	325	102,133	108	408,532
Nevada	58	20,780	358	6,927	119	27,708
New Hampshire	244	106,700	437	35,567	146	142,268
New Jersey	2,941	865,000	294	288,333	98	1,153,332
New Mexico	82	151,100	1,843	50,367	614	201,468
New York	11,278	2,666,000	236	888,667	79	3,554,668
North Carolina	865	1,037,000	1,199	345,667	400	1,382,668
North Dakota	278	169,800	611	56,600	204	226,400
Ohio	4,108*	1,477,000	360	492,333	120	1,969,332
Oklahoma	751	614,000	818	204,667	273	818,668
Oregon	936	214,400	229	71,467	76	285,868
Pennsylvania	6,254	2,300,000	368	766,667	123	3,066,668
Rhode Island	350	156,500	447	52,167	149	208,668
South Carolina	449	568,000	1,265	189,333	422	757,332
South Dakota	310	161,100	520	53,700	173	214,800
Tennessee	873	761,000	872	253,667	291	1,014,668
Texas	2,144	1,615,000	753	538,333	251	2,153,332
Utah	319	150,000	470	50,000	157	200,000
Vermont	161	83,000	516	27,667	172	110,668
Virginia	888*	700,500	789	233,500	263	934,000
Washington	1,303	337,800	259	112,600	86	450,400
West Virginia	706	526,500	746	175,500	249	702,000
Wisconsin	2,383	707,500	297	235,833	99	943,332
Wyoming	126	58,850	467	19,617	156	78,468
Total	76,444	30,223,480	395	10,074,496	132	$40,297,984

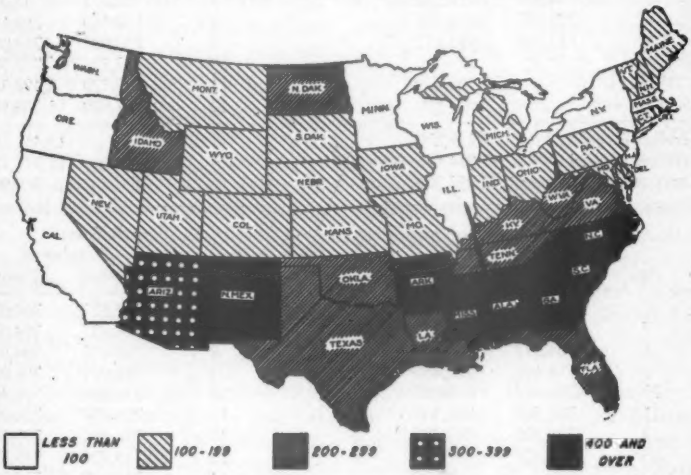
*1941 figures are used because 1940 figures were not available.

pated. It may also be accepted as a reasonable estimate for present purposes that the proportion of the population of the U.S.A. which needs financial assistance, with respect to professional services for health care, corresponds to a case load of approximately one-third of the population in normal times.

On the basis of these two estimates, it it possible to determine an average number of persons to be cared for, in the indigent group each year, by each dentist in a national maintenance program of protective dentistry. These figures form the sixth column of Table 2. They are tentative only. While they will need some modification state by state to measure correctly the load per dentist, the estimate for the U.S.A. as a whole is probably acceptable and, for practical purposes in a preliminary survey of the problem, the state figures provide a fairly satisfactory base.

A graph of the distribution of service load per registered dentist is helpful in comprehending the general pattern for the U.S.A. as a whole. This is given in the accompanying map (Fig. 1), where 5 degrees of shading, corresponding to increments of up to 100 young indigent persons per dentist, show, in their progressive change from white to black, an increasing density of potential load per dentist. The supply of professional services to meet the needs defined by this study is far from being reasonably balanced throughout the nation. Even with a most generous allowance for a lower incidence of caries in the south than in the north, the disparity calls for careful consideration. The west coast, the north central states and New York enjoy a relatively highly favored position, with grave need casting a heavy shadow over the southeastern area. This matter alone is a problem that should not be lightly regarded, much less ignored.

DENSITY OF INDIGENT PERSONS (6-18 YEARS) PER DENTIST



ESTIMATED COST OF THE PROGRAM

The last column of Table 2 translates the estimated need of protective dentistry for the indigent into total needed appropriation for each state on the basis of an allowance of $4 per child to be served. The total cost of the program for the U.S.A. as a whole, so derived, is $40,297,984 per year.

The foregoing analysis has sought to establish tentative figures for the maintenance of a program of protective den-

tistry in the indigent population. It has assumed that the program would be carried out by the existing dental profession at current costs of professional services. It also assumes that the population will remain stationary at the 1940 level, which we can be certain will not be the case. An increase in the indigent 6-18-year population would of course necessitate an increase in the amount budgeted, and vice versa. Any change in the average cost of the type of filling and other necessary services required under this maintenance program would also directly affect the required budget.

TABLE 3.—SERVICE LOADS UNDER SUGGESTED PLAN FOR INITIATION OF THE PROGRAM

First Year			Second Year		
	Number of			Number of	
Age	Persons	Teeth	Age	Persons	Teeth
6	704,077	704,077	6	704,077	704,077
7	710,460	1,420,920	7	704,077	704,077
8	720,087	2,160,261	8	710,460	710,460
9	733,503	2,934,012	9	720,087	720,087
			10	733,503	733,503
			11	749,720	4,498,320
			12	767,020	5,369,140
Services given		7,219,270			13,439,664
Services allowed		10,074,496			12,929,722
Carryover to next year		2,855,226			−509,942

Third Year			Fourth Year		
	Number of			Number of	
Age	Persons	Teeth	Age	Persons	Teeth
6	704,077	704,077	6	704,077	704,077
7	704,077	704,077	7	704,077	704,077
8	704,077	704,077	8	704,077	704,077
9	710,460	710,460	9	704,077	704,077
10	720,087	720,087	10	710,460	710,460
11	733,503	733,503	11	720,087	720,087
12	749,720	749,720	12	733,503	733,503
13	767,020	767,020	13	749,720	749,720
			14	767,020	767,020
			15	783,797	7,837,970
Services given		5,793,021			14,335,068
Services allowed		9,564,554			13,846,029
Carryover to next year		3,771,533			−489,039

INITIATION OF THE PROGRAM

Let it now be assumed that a sum of $40,297,984, as calculated above, will be made available annually for reimbursement of the dental profession for care rendered to 10,074,496 indigent children per annum. (Table 2.) How would the program be initiated to the greatest advantage of the nation? To attempt the first year to service only the most recently decayed tooth in each eligible child between 6 and 18 years would certainly not be of the greatest benefit to the nation as a whole. Comparatively little good would accrue to those in the older age groups. Only the 6-year-olds as a group would be receiving full protective care, and many years might elapse before much benefit would be felt on a national scale. It would seem far more advisable in the first year to care completely for the younger age groups, so

far as the money available would permit. During the first year, it would be possible to give full protective service to perhaps all indigent children in the 6 to 9 or 10 year group, going as high in the age scale as the annual appropriation would permit. In the second year, this group would be maintained at an average rate of one tooth per person, a new 6 year group would come into the program and the balance of funds would be devoted to the needs of the older children, starting where the first group left off.

It is of interest to see how such a program would affect the backlog of those over 6 years of age when the maintenance project was started. We shall use the figures for the U.S.A. as a whole for this purpose, since it would probably be deemed desirable that a unified schedule by age be established for all states. Based on the total of 10,074,496 teeth to be serviced per year, the possible coverage can be computed directly from the figures in Table 1. The results are shown in Table 3. It appears that all children in the 6-9 year group could be cared for completely the first year with an expenditure of less than $30,000,000. This would leave an unexpended balance from the maintenance appropriation corresponding to services for nearly 3,000,000 teeth. We shall for convenience carry it over to the next period. In the second year, it would be possible not only to maintain those already serviced, and to introduce a new 6-year group, but also to extend the age range for those in the program by two years at the upper end. The 11-12 year groups (they were 10 or 11 in the first year of the project) would thus be new additions to the program. This year, there would be a small deficit to carry over. No new older group could be added the third year, but an accumulated surplus would allow the 15-year group to be added the fourth year. Beyond this, no new groups could be added in the upper age range. In seven years after initiation of the program, all indigent children up to and including those 18 years of age would be receiving full protective dental service. That year and thereafter, on the basis of this program alone, approximately 750,000 persons annually would be attaining their eighteenth year of age with all their teeth in sound condition.

Table 3 is obviously concerned with a principle of effective utilization of a budget for the best national welfare. The load on the dental profession has been allowed to vary radically. This, however, may be completely adjusted to uniformity by dealing with age classes of children determined by month of birth in addition to year. Thus, the first year program could include all those over 5 years of age born after April 1, let us say, in a specified year. It would then include about 75 per cent of the 10-year class, and leave no carry over of services or budget to the next year. There is no value to detailing such minutiae in this report. The important matter is the principle of progressive complete protection of age classes. Several years would thus be saved in giving full protection, at the sacrifice only of a skimpy partial protection for a few older age classes.

Once again, it is necessary to emphasize that these figures are based on an initial population like that given by our graduation of the 1940 census data. The population could not actually remain stationary in this form, but the estimate is nevertheless serviceable. An annual appropriation that would change proportionately with the 6-18 year population would, of course, give essentially the same coverage.

When it is recalled that the armed forces of the United States of America recently suffered an enormous loss of potential manpower because of lack of proper protective dental measures in childhood and youth, one may well consider the annual appropriation needed for this program as one of the most

profitable investments conceivable from the point of view of national welfare in the critical times of war. The fact that it would give complete maintenance for all indigents up to and including those 18 years of age within seven years of its initiation, without more than the normal maintenance appropriation, would seem also to be a fact of great significance.

The impetus that such a national program of protective dentistry would give to public appreciation of the value of care of the teeth would undoubtedly be very significant. Ability of the more fortunate to meet the cost of good dental care would probably be increasingly matched by willingness to do so, particularly as the advantages of early care of defects became more manifest.

FREQUENCY OF ALLERGY IN ORTHODONTIC PATIENTS

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THE frequent observation of allergic manifestations in the oral cavity has actuated the desire to investigate, on a larger scale, the frequency of allergy in patients applying for orthodontic services. It was suspected that, in many instances, an allergic tendency might be a factor in the etiology of dentofacial anomalies. Cohen,[9] Duke[17] and Bowen[2] state that dental irregularities with accompanying facial deformities are often due to certain types of allergy. Very little on this subject appeared in the literature prior to 1931. Since that time, comparatively few, if any, actual statistical data have been presented to substantiate these claims although many allergic manifestations have been observed in the oral cavity and reported in the literature.[34, 42, 32, 45, 31, 19, 13]

The derivation of the term allergy is from two Greek words, *allos,* meaning altered, and *ergia,* meaning reactivity. According to the many students in this field,[43, 36, 35, 16, 28, 23, 13, 42] the term allergy, broadly speaking, today implies an acquired or hereditary hypersensitiveness of the body tissues to foreign, ordinarily innocuous substances, a reaction which cannot occur in normal people on contact with the same substances. The purpose of this study is to survey the principal papers in this field and to investigate the frequency of allergy (especially chronic nasal allergy) in a group of orthodontic applicants by means of clinical scratch and intradermal tests of the more common allergens and careful patient and family histories.

MANIFESTATIONS OF ALLERGY

According to Fuchs,[25] Vaughan,[42] Rowe,[34] Cooke[13] and Spain,[38] the incidence of allergic manifestations in our general population runs from 10 to 60 per cent. Ten per cent have an active allergy and the additional 50 per cent give a history of allergic disturbances.

BONE SCORINGS

Todd[40] showed that children suffering from subclinical disturbances have

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changes demonstrable in roentgenograms in the growing ends of long bones, particularly the distal end of the tibia. "These changes, called scorings, consist of fine transverse lines of increased density in the ends of the shafts of the long bones which differ from those produced by infectious diseases and injuries called scars in that they do not run across the entire width of the bone, are narrower, less dense and have a watered silk appearance."

Cohen and Friedmar[12] described such bone scorings as common in children with allergy up to 6 years of age and having a tendency to disappear as the child gets older. Their own observation during a two year period enabled them to confirm the presence of bone scorings in practically every child under 6 years of age who had a food allergy, and they seldom found them present in those who had a pure respiratory allergy without gastro-intestinal symptoms.

In contrast, Chobot and Merrill[7] studied seventeen children with food and respiratory allergies, six suffering from rickets and seven children used as a control group with no demonstrable allergies. They found a high percentage of bone scorings in children who had no allergy and also an absence of scorings in children having a definite allergy. Notwithstanding the fact that these bone scorings have been observed by the authors noted, their existence has been denied by others. Many pediatricians and allergists therefore agree that bone scorings can occur as the result of allergy, but that various other systemic conditions may also be responsible for them. The wisdom, therefore, of using these scorings as an important diagnostic criterion for allergy is open to question.

EOSINOPHILIA

Probably one of the outstanding manifestations of allergy is a pronounced eosinophilia. The normal number of eosinophils is approximately 2 per cent, but, in allergic conditions, there is a marked increase. Ratner[31] believes that when a differential count for eosinophils is made on blood taken from the gingiva and from the finger, the gingival blood of allergic patients will have as high as 15 to 45 per cent eosinophils, while, as a rule, the finger blood will be normal, if the allergic condition is limited to the gingiva. However, if there is a general allergy, the entire blood may also contain a high eosinophil count.

Schlecht[36] was the first to inject foreign proteins into animals, thereby causing an increase in the number of eosinophils experimentally. Orban[29] writes:

> Owing to some, or most, so-called allergic conditions, the eosinophils increase not only in the blood, but also in tissues of the lungs and mucous membrane of the nose. What is the function of these eosinophile cells in the inflammatory reaction of the pulp and gingiva? No specific function of these cells is known up to the present. The explanation advanced seems to be that they have an affinity for decomposition products of tissues in general and probably for degenerated epithelial tissue in particular, which was first claimed by Ehrlich and Lazarus. It is quite possible that allergic reactions play an important rôle in their connections.

According to most authors, there is usually an increase of eosinophils in allergy and it is an aid in diagnosis. In contrast to their statements, as pointed out by Brown[5] and others, allergy may be present without any increase in the eosinophile count. On the other hand, an eosinophile increase may also be due to the presence of intestinal parasites, trichinosis, leukemia or Hodgkin's disease.

DENTOFACIAL ANOMALIES

The first description of nasal allergy and its relation to dentofacial anomalies appeared in the literature in 1930 in an article by Duke,[17] who emphasized the

difference between changes due to the presence of adenoids or mouth breathing and nasal allergy. He gives the following description:

The paranasal sinuses in order to develop normally must have their openings into the nose normally open a greater portion of the time to allow the proper aeration and drainage, and blockage due to mucous edematous membranes or polypoid tissue causes the following change to take place. The nasal process of the maxillary bone becomes less prominent followed by a depression below the anterior portion of the zygomatic arch in the area over the antra. The lack of development in this region or paranasal depression accentuates the prominence of the nose and cheek bones. The maxillary arch usually collapses and the teeth drift forward due to mouth breathing, causing a type of face which is characteristic of this condition. Nasal allergy produces this type of face by the fact that the ethmoid cells and antra because of defective aeration has not kept pace with the development of the patient's face. The development of the bones of the face is due in part to vacuum and pressure under normal conditions. In comparison this deformity rarely occurs in children with seasonal allergy even though the condition may be severe enough to cause complete blockage of the nose for several weeks.

Bowen,[8] in a comparative study of a total group of 500 children between the ages of 6 and 14 years, divided his cases into five groups of 100 each as follows: 1. Negro school children. 2. Indian children. 3. White children. 4. Crippled children, hospital cases. 5. Children suffering from chronic nasal allergy.

In the first four groups, he found from 4 to 7 per cent dental and palatal deformities, probably due either to past thumbsucking, the presence of adenoid tissue, sleeping habits, leaning habits, genetic conditions or any perverted habit. In the fifth, that is the allergic group, the maxillary deformities exceeded 24 per cent. In this group, all children had the tonsils and adenoids removed before 5 years of age. Bowen further states that, in those with perennial nasal allergy, protruding maxillary teeth and retruding lower jaw deformities are primarily due to retardation of sinus development as a result of the allergic state. He concludes that the cause of chronic nasal allergy in infants and young children should be detected and eliminated early to prevent dentofacial deformities and that some of the relapses after orthodontic treatment may be due to this condition.

Cohen[9] gives a very interesting history of allergy from birth until the child is presented for orthodontic treatment as follows:

From the third to the sixth week of life, the first sign of allergy may appear in the form of colic and regurgitation of food. This problem may be solved partially, but the child usually remains a feeding problem. A few weeks later eczema appears either as a diaper rash, slight crusting of the scalp to a universal weeping eruption with general irritability, increased urination, changes in muscle tone, and with gastro intestinal symptoms. At about six months of age nasal symptoms begin such as nasal stuffiness, nose rubbing, and mouth breathing, the first evidence of inhalant sensitivity and sometimes thumbsucking. During the first year the nasal symptoms usually increase while the eczema decreases and, as the respiratory phase increases, plans to remove the tonsils and adenoids at an early age are made. In the following winter a croupy cough develops. It is spasmodic in nature usually associated with wheezing respiration and fever until finally asthmatic bronchitis is diagnosed as bronchial asthma. At three years of age, there is often an increase in either the bronchial or nasal symptoms in the summer months during the pollenating seasons and the child now has seasonal hay fever. A physical examination at this time would show the child to be short, light in weight and thin with a definite pallor. The skin is dry and may show slight eczema in the folds and a decided loss of muscle tone. The nose shows turbinate congestion and there may be a slight evidence of slight wheezing. The face is flat and narrow with an orthodontic deformity consisting of narrow arch and protruding teeth. Mentally he is an irritable whiny child, erratic in behavior with a short attention span, and

hyperactive periods followed by great fatigue.

In these allergic children the orthodontist has a complex problem and unless the allergy is diagnosed and treatment instituted he is greatly handicapped. The child may try to cooperate with the orthodontist, but he is severely handicapped by allergy, which affects not only his general behavior, mental outlook and the possibility of trying to breathe normally. The orthodontist is usually doomed to an uphill fight against unsurmountable barriers and often with a relapse of the teeth to former positions and ultimate failure.

Cooke[13] observed that nasal blockage was a frequent cause of malocclusion and placed particular stress on the hypertrophied tonsils and adenoids and obstructions of the passages in children between the ages of 2 and 8. He claims that changes in the nasal membrane due to allergy are not common before the sixth year and are the most frequent cause of the deformities encountered by the orthodontist. He believes that nasal blockage can and should be treated early in life to prevent the development of malocclusion.

Todd[40] emphasized in his studies that the deficiency of facial growth is apparent in the first year and allergic sensitivity most clearly evident in disturbances of the gastro-intestinal tract, and then gives a history similar to that described by Duke and Bowen for the first two years of life. In the third year, he described disturbances with high fever, beginning of turbinate congestion, morning sneezing and nasal discharge, and states that this blocking or occluding of the passages results in the narrow pinched condition of the nose and contraction of the upper dental arch, so that there is inadequate space for the developing and erupting teeth. This ends in a malocclusion often baffling in its unresponsiveness to the current methods of orthodontic treatment.

Fuchs[25] says, "There is an unusually high frequency of facial, dental and palatal deformities in patients suffering from chronic nasal allergy with or without asthma." He explains that the above-mentioned dentofacial deformities are probably the direct result of interference in growth during early childhood and expresses the opinion that successful orthodontic work is practically impossible in the presence of untreated nasal allergy.

Rowe[34] emphasized the need of orthodontic treatment in children suffering from nasal allergy because of frequency of high palates, narrow and protruding upper dental arches and, at times, open bite, and implies that, with proper attention to the allergy, the orthodontic treatment is more apt to be successful and the results are more lasting.

Kennedy[27] also described the inhibition of dentofacial growth, with protruding and excessive overriding maxillary incisor teeth and a high narrow arch, and stated that early recognition of this condition and treatment of nasal allergy may eliminate the necessity of later orthodontic treatment.

Todd,[40] Bowen,[2] Cohen,[9] Fuchs[25] and many others agree that perennial nasal allergy interferes with the bony development of the nasal process of the maxilla, the anterior portion of the zygomatic arch and the area over the antra, and causes contraction of the maxillary arch and protraction of the anterior teeth. The resultant dentofacial deformity has been typically described by many in such terms as "a typical mouth-breather," "adenoid face," "an allergic face," "typical gothic arch," and classified according to malocclusion, usually as Class II, Division 1 (Angle). With allergy beginning virtually at birth, the growth pattern may be inhibited and changed to counteract the inherent growth pattern and hereditary tendencies, with a resultant dentofacial anomaly.

SKELETAL MATURATION

The severity of the effect on skeletal maturation depends on the type and degree of allergy, food allergy being the important deterrent in delay of bone maturation. Nasal allergy, however, af-

fects the area immediately surrounding the maxillary arch.

ORAL DISTURBANCES

Patients with allergies due to foods, drugs, various contactants and bacteria often present oral manifestations as, for instance, an allergic gingivitis. (Rowe.[34]) Reid[33] made similar observations of various types of allergic gingivitis and gave typical histories of allergy due to ingestion of foods in the Poaceae group and streptococcus and pneumococcus organisms. D'Elia[19] described allergies due to mercury in dental filling materials, adrenalin therapy, infection and contact with denture materials, foods and drugs. Similar observations were made by Kennedy[27] of a patient who was allergic to mercury. Recovery was prompt after the removal of the amalgam fillings.

The importance of an understanding of the various allergic manifestations among which are nasal allergy, dentofacial changes, gingivitis and delayed skeletal maturation, by the orthodontic practitioner, is obvious, and it cannot be overemphasized that additional clinical observations are required in order to enable him to study these characteristics for a sound approach to successful treatment of young patients. Asthma, eczema, hives (angioneurotic edema), headaches (migraine), gastro-intestinal symptoms, allergic sinusitis and other symptoms of allergy have not been described and a textbook on allergy is recommended for their description.

DESCRIPTION OF MATERIAL AND PROCEDURE

For the purpose of determining the frequency of allergic tendencies in orthodontic applicants and groups of children already under orthodontic treatment, 104 patients (fifty-eight female, forty-six male) of the orthodontic division of the University of California College of Dentistry were examined in the following manner:

1. A careful medical examination was made with additional studies of blood counts, basal metabolism and urinalysis.

2. In the family and personal history, careful attention was given to any possible allergic manifestations occurring in the past or present.

3. Children with positive, questionable or borderline histories were given both scratch and intradermal tests. According to Walzer,[44] the first test for cutaneous allergy was made by Kirkman, in December 1835. He was a hayfever sufferer and tested himself as to the pollen of sweet vernal grass by sniffing it and rubbing it with his hand. Blackley,[4] in 1873, reported intentional skin tests with application of several types of pollen to the abraded skin, the resultant positive and negative reactions depending on the pollen used. In 1911, Robert A. Cooke[13] first employed intradermal testing in general for allergic diagnosis primarily for inhalant allergy, while Schloss,[37] in 1912, broadened the field of the skin test in applying it to food allergy. Clowes,[8] in 1913, employed scratch skin tests for the diagnosis of ragweed pollen sensitization. Persons with negative histories were not tested. All examinations were made in the forenoon. The scratch tests were made in the following manner: The forearm was cleaned and sterilized with grain alcohol. Fifteen marks were put on the arm (Pinéss[30] and Balyeat[1] have found the back especially convenient for scratch testing, particularly in infants and children) 1 inch apart with ink, and opposite these fifteen marks scratches were put approximately one inch long with a fine dulled scalpel. The scratches were deep enough to penetrate the superficial layers of the skin without drawing blood. It is important that the scratches be about 1 inch apart to obviate interference of reactions with one another. Scratch tests were made with the following allergens listed in Table 1.

The grasses, weeds and danders were obtained in liquid form from Cutter Laboratory with self-contained glass ap-

plicators. The milk, egg, wheat and house dust came in powder form. The dry allergens were taken from the containing bottle on the end of a sterile toothpick, placed on the scratch already moistened with N/10 sodium hydroxide. The allergen was then rubbed into the scratch. The first scratch was used as a control and only N/10 sodium hydroxide was placed on it. The immediate readings were made from fifteen to thirty minutes after application and the skin reactions were recorded as follows:

O—No erythema or wheal larger than control.

+—Erythema or wheal slightly larger than control.

++—Definite erythema or wheal with slight pseudopodiae.

+++—Marked erythema or wheal with definite pseudopodiae.

++++—Large erythema or wheal with definite pseudopodiae.

In addition to these scratch tests, milk, eggs, wheat and house dust were further tested intradermally on the upper arm provided no violent reactions were obtained to the foods and house dust in the previous scratch test. For this preliminary study and clinical routine use, it was felt that this rough screening was acceptable as adequate. It must be recognized that some allergies might have been overlooked because only a few of the most common allergens were tested. In the more comprehensive studies of many allergists, more than 300 tests are made, as indicated in Table 2. When the examinations were completed, the patients having a positive record were recalled and rechecked against the data previously obtained, particular stress being placed on the family and patient history. According to these tests, the 104 patients were classified into a definitely allergic group, a borderline group and a non-allergic group.

The borderline groups, or questionable cases, are often classified differently according to the training and beliefs of the particular operator.

4. The mucous membrane of the entire oral cavity was carefully examined for the presence of allergic gingivitis or any other allergic manifestations. Notations were made of the type of appliance and retainers when present. In many, gingivitis was present, owing to poor hygiene, the presence of bands, allergy or a combination of all three.

5. A determination of the *Lactobacillus acidophilus* index was made in sixty-four patients by Foor.[24]

6. The allergic patients were also checked according to Angle's classification for the type of malocclusion.

TABLE 1.—ALLERGENS USED IN SCRATCH TESTS

Grasses	Weeds	Foods and House Dust	Danders
1. Lolium multiflorum (Australian rye)	1. Artemisia california (Coast sage)	1. Milk	1. Chicken feathers
2. Bromus rididus (Ripgut)	2. Chenopodium album (Lamb's quarters)	2. Eggs	2. Cat hair
3. Poa annua (Annual blue)	3. Rumex acetosella (Sheep sorrel)	3. Wheat	3. Horse hair
		4. House dust	4. Rabbit hair

RESULTS

1. The family and personal histories, as well as scratch and intradermal tests, of 104 orthodontic applicants uncovered a surprisingly large number of allergic persons: forty-one, or 39.4 per cent, were definitely allergic; thirteen, or 12.5 per cent, were borderline, and 50, or 48.1 per cent, were negative.

2. The medical examinations of these patients revealed many abnormal conditions, by no means of a uniform type, and included: allergies of all descrip-

tions, adenoids, endocrine disturbances, (thyroid and gonadal dysfunctions, diabetes, etc.), congenital heart disease, syphilis, malnutrition with an early history of rickets, tuberculosis, sinus and mastoid diseases, cleft-palate and harelip, etc. These conditions were generally distributed among the allergic as well as non-allergic.

TABLE 2.—TESTS MADE IN COMPREHENSIVE STUDIES

FOODS: Cereals, barley, buckwheat, corn, oats, rice, rye, cow's milk, albumin, cow's milk casein, cow's milk cheese.
VEGETABLES: Artichoke, asparagus, avocado, beet, cabbage, carrot, cauliflower, celery, garlic, kidney bean, lima bean, mushroom, okra, olive, onion, pea, potatoes, sweet potatoes, white, pumpkin, rhubarb, soy bean, string bean.
FRUITS: Apple, apricot, banana, cantaloupe, grapefruit, lemon, orange, peach, pear, pineapple, prune, strawberry, watermelon.
CONDIMENTS: Cinnamon, mustard, pepper, black or white, sage, cocoa, coffee, tea, honey, hops, yeast, almonds, peanuts, walnuts, black.
MEATS: Beef, chicken, duck, domestic, lamb, pork.
FISH: Bass, clam, codfish, crab, halibut, lobster, oyster, salmon, shrimps, white fish.
TREES: Acacia, apple, arizona ash, black walnut, birch, box elder, butternut, cottonwood, cypress, cedar, elm, eucalyptus, hickory, locust, maple, mountain cedar, oak, olive, peach, pear, prune, poplar, privet, sycamore, willow.
POLLENS: Poaceal barley, Bermuda grass, canary grass, English rye, fescue, Johnson tim-grass, Kentucky blue grass, orchard grass, red top salt grass, slender wild rye, timothy, velvet grass, wack grass, wild oats, English plantain, dock.
EPIDERMALS: Camel hair, canary feathers, cattle hair, duck feathers, goat hair, goose feathers, sheep wool.
COMPOSITAE: Alfalfa, burweed, cocklebur, dandelion, false ragweed, giant ragweed, golden rod, marsh elder, mountain sagebrush, mugwort, short ragweed, western ragweed.
MISCELLANEOUS: INHALANTS: Cottonseed, feed dusts (according to occupation), flax seed, glue, kapok, lycopodium, briss root, pyrethrum, silk, tobacco.
CHENOPODIACEA: Bractscale, pickleweed, rough pigweed, Russian thistle, white goosefoot, spearscale.
FUNGI: Ten fungi yeasts such as: Beer, baker's brewer's, distiller's.

3. Blood studies showed that the hemoglobin content and the number of erythrocytes and leukocytes were normal with few exceptions. The eosinophile counts of seventy-four children available showed frequently a decided increase. (Table 3.)

Of the allergic patients, fifteen had an eosinophil count of 1 and 2 per cent, eighteen, from 3 to 16 per cent. Of the non-allergic, ten had eosinophil counts higher than 2 per cent, while the remaining twenty-two fell within normal limits. Among the borderline cases, three had high eosinophil counts.

4. Of the forty-one patients with chronic nasal allergy, thirty-nine were available for a classification of their malocclusion according to Angle. Twenty-four, or 61.5 per cent, had contracted maxillary arches with accompanying protraction of the anterior teeth and retraction of the mandible or mandibular teeth. Twenty-two were classified as Class II, Division 1, and two as Class I. The latter two had a maxillary contraction with protraction of the anterior teeth. The remainder were classified into: thirteen, Class I; one, Class II, Div. 2, and one, Class III. It is interesting to note that the frequency of 61.5 per cent dentofacial anomalies as observed in these 104 patients is more than twice as great as that of 24 per cent reported by Bowen. This high percentage of allergic patients with the typical picture of nasal blockage and paranasal depressions, pinched nares, contraction of the maxillary arches with protraction of anterior teeth, receding chins and lack of development in facial growth suggests that, in most cases of nasal blockage, allergy must be suspected and considered definitely related to the development of dentofacial anomalies.

5. In seven, or seventeen per cent, of the allergic patients, a pronounced gingivitis was found which could be distinguished from acute inflammation and hypertrophy of the gums as allergic in

type. The interproximal tissue was, in many instances, slightly puffy, and had changed from the usual coral pink to purplish whitish pink. The gingivae had an appearance and texture somewhat similar to those of the swollen, dampish, whitish mucous membrane of an allergic nose. In many cases, it apparently needed only the addition of bands to activate the condition.

6. The acidophilus indices of sixty-four patients revealed that, in the non-allergic groups, twenty-two were positive and ten negative; while, in the allergic group, sixteen were positive and one negative. If the borderline groups are excluded, the percentages were approximately the same, and no relation was found between allergic tendency and the presence or absence of lactobacilli.

TABLE 3.—EOSINOPHIL COUNT OF SEVENTY-FOUR ORTHODONTIC APPLICANTS

	Number of Persons	Per Cent 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Allergic	33	8	7	3	5	4					1	1		2	1		1
Borderline	9	3	3			1	1						1				
Non-allergic	32	12	10	8	1				1								
Total	74	23	20	11	6	5	1		1		1	1	1	2	1		1

COMMENT AND CONCLUSION

The cephalometric studies of Brodie have demonstrated that the growth patterns of the craniofacial complex do not change much from birth to maturity, and that the patterns of each Class II, Division 1, or protraction of upper incisors with retracted mandible or teeth, are laid down very early. In the light of the foregoing study, an allergic tendency as an influencing agent in the growth of the face must be taken into account as an important factor in nasal, sinus, facial and jaw growth. For instance, since poliomyelitis occurring during childhood may change the pattern of growth of the long bones, it is easily conceivable that an allergy might also alter the inherent and hereditary factors in jaw and facial growth and may account for certain dentofacial anomalies.

In considering the large number of orthodontic patients suffering from allergy in a group of 104 patients, it is evident that one of the most effective ways of reducing the incidence of dentofacial anomalies may be the early detection of chronic nasal or respiratory allergy with subsequent treatment to eliminate it. Then many of the Class II, Division 1, cases, due supposedly to such habits as mouth-breathing, to chronic colds or the presence of diseased or enlarged tonsils and adenoids, might be prevented. By taking careful histories, most suspected cases of chronic nasal allergies can be readily recognized, and can then be referred for treatment.

Both the medical and the dental profession must be urged to direct their attention to the early recognition of chronic nasal or respiratory allergy as an important factor in the etiology of dentofacial anomalies, and to institute treatment for its eradication.

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BITE OPENING: A CEPHALOMETRIC ANALYSIS

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It is well known by the dental profession that a close bite may be treated by various mechanical devices. Not so well known are the changes that ultimately take place in the anatomic form of the head when the bite is opened. The purpose of this study is to determine, by cephalometric methods, the changes that occur when the biteplate is used to induce this opening.

The literature indicates that there are various schools of thought relative to the changes occurring when this device is employed. Mershon[1] evidently believes that the changes can be only in the mandibular area, since he states that "the only permanent change which can be brought about in the use of the biteplate is the depression of the anterior teeth into the alveoli." This, of course, would not open the bite, but would reduce the overlapping of the teeth in the anterior region of the dentures and therefore compensate for the close-bite appearance of the dentition without increase in vertical dimension of the face. Mershon is of the opinion that the vertical height of the face is controlled by the length of the muscles and not by bone.

He contends that, since muscle cannot be induced to lengthen, any increase in bone length obtained during the wearing of the bite plate will be temporary and the bone will in time be returned to its original height owing to the pull of the musculature. Mershon's opinion is supported by Mackenzie[2] when he states, "It is the length, size and tonicity of the muscle that maintains the normal length and size of the bones, and not the reverse, as so often and erroneously thought." Mershon's claim that only the intrusion of mandibular incisors results when a biteplate is worn is not supported by any scientific data.

Wolfson[3] has presented four cases in which he used a maxillary anterior splint to overcome the deep bite. His measurements of the "dentofacial casts" seem to indicate an intrusion of the mandibular incisors of as much as 4 mm. His measurement method can be questioned, since this change might have taken place owing to vertical growth in the posterior region of the jaws or to changes in the mandibular position, neither of which he takes into consideration.

Hemley,[4] in contrast to these investigators, is of the opinion that the bite can be opened with little or no intrusion of the mandibular posterior teeth. His conclusions are based on twenty-two cases in which external measurement methods were employed. With respect to mandibular incisors, he states, "In only one case out of twenty-two was there any depression of the mandibular incisor teeth, a loss of one millimeter. In all the other cases, there was usually no change whatever, or occasionally a slight increase in height." Hemley, in disagreement with Mershon, is of the opinion that even if we could depress the mandibular incisors, once the pressure is removed these teeth would resume their original height. With reference to Mershon's assertion that the length and size of muscle are unchangeable, Hemley states that the tonicity of muscle is important, as had been origi-

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nally stated by Mackenzie. Hemley states: "It is my contention that the influence of the hypertonic muscles on the alveolar bone growth can be controlled by the use of the biteplate. The biteplate relieves the strain of the abnormal pressure and thus permits growth." Strang,[5] in discussing Hemley's paper,[4] says:

> I have felt from clinical experience that the biteplate really did elevate the molars . . . that it had no effect along the lines of depressing the incisors . . . of sufficient degree. . . . My clinical experience does not agree with Dr. Mershon along this line. I have cases in which infra-occlusion of the molars was present. A biteplate was used which showed a very satisfactory result ten and fifteen years after removal of all appliances. Consequently, I think that there must be some mode of adjustment of these muscles, perhaps as Hemley has spoken, in their tonicity, which permits them to allow the occlusal plane to be raised.

Breitner[6] has done some stimulating and interesting experiments on changing the vertical dimension or opening the bite on monkeys, and then studied the changes histologically. By placing "caps" on the six maxillary anterior teeth, the bite was opened and, after forty-nine days, the posterior teeth had returned to occlusion again. Histologic slides showed changes both at the condyle and at the fossa, indicating that "the condyle apparently is growing distocranially." There were also changes at the angle of the mandible indicating a "development of a more obtuse angle." In a subsequent paper,[7] Breitner says:

> These bone transformations seem to indicate that any artificial change of the vertical dimension not only influences the alveolar processes, but also leads to changes in shape and position of the mandible. The bone transformations subsequent to raising of the bite might be regarded as nature's intention to reestablish the original vertical dimension and, with it, the balance between muscular action and architecture of the bone.

Breitner's earlier paper[6] was discussed by Reisner[8] thus:

> Dr. Breitner's histologic demonstration corroborates some of the effects which I have recorded roentgenographically . . . I have recorded these changes roentgenographically in the joint, in the angle of the jaw, and in the head of the condyle.

Hopkins,[9] speaking of biteplates and without giving scientific evidence, states that "it opens the bite for the possible vertical growth in the molar and premolar region so often required and so slowly obtained by other methods." Callaway[10] feels that biteplates can be used for either intrusion or extrusion of posterior teeth and for intrusion of mandibular incisors. He has presented some cases without stating where the changes might have taken place and without giving actual measurements.

Further discussion of the works of these various men will be included in a later section of this paper after the experimental procedure and findings have been presented.

EXPERIMENTAL PROCEDURE

Twenty cases were finally selected for this study. This is not a large group, but it was decided that the quality of the records was more important than the number of cases. During the last ten years, the staff of the Department of Orthodontics of the College of Dentistry, University of Iowa, has been securing records of many more cases in which the biteplate was worn and which were originally intended to be included in this study. However, only the twenty cases mentioned fulfilled all requirements. The reason for rejecting the remaining cases was that other orthodontic treatment was being carried on simultaneously with the wearing of the biteplate or that records obtained gave insufficient or incomplete data. The various reasons for opening the bite in the twenty selected cases were to improve function, facilitate dental restoration, prevent further wear of the teeth, especially the incisors, eliminate trauma and irritation and improve the appearance.

The plate was of the usual Hawley retainer design for the maxillary arch with either a vulcanite or an acrylic base. (Fig. 1.) Stainless steel clasps were used on the first permanent molars, with a labial wire of the same material extending from canine to canine. Often, clasps on the first bicuspids were substituted for the labial wire. The base covered the entire palate, extending slightly beyond the first molar area. When the jaws attempted to close, the mandibular incisors contacted the biteplate holding the jaws apart so that the maxillary posterior teeth were separated from those of the mandible by a space meeting the needs of the individual patient, but never permitted to exceed the space allowed by the physiologic rest position of the mandible.

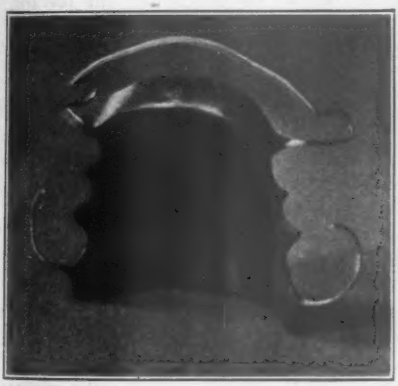

Fig. 1.—A Hawley type bite-plate. A similar appliance was used to open the bite for all cases included in this study.

There were nine females and eleven males in the group. No attempt was made to compare the two sexes or to evaluate them separately. The age range was from 10 to 26 years, eight being under 15 and twelve over 15. The treatment period varied from two to about eight months. All of the younger patients, those below 15 years of age, were placed under observation for various periods of time to determine whether natural growth processes would open the bite. Only after such a period of observation had shown no apparent improvement was a biteplate placed in the mouth. The rapid improvement thereafter was convincing as to the stimulating effect of the appliance. It was interesting to note that for two patients of 10 and 11 years, the desired bite opening was obtained within two weeks, and thereafter the appliance was used as a retainer only. Most of the older patients were not placed under observation because it was felt that they had reached a more or less stationary level of growth. Patients wearing the biteplate were seen at first every week and then every two weeks for observation and, when necessary, adjustment of the appliance.

Fig. 2.—A. X-ray tube. B. Casette and holder. C. Head positioner.

Each patient had at least two profile roentgenograms taken, one before the treatment was begun and the other after the desired vertical dimension was obtained. The technic and procedure for

taking the roentgenograms was that employed and described by Higley.[11] The technic is essentially this: The patient's head is so positioned in a head holder (Figs. 2 and 3) that the midsagittal plane is at a fixed distance from the target and film and parallel to the film. The midcentral roentgen-ray is focused to pass through the head on a transverse axis at the level of the ear holes and be at right angles to the midsagittal plane of the head and the film. By using this equipment, it is possible to reorient the head in the same position for a series of head roentgenograms. Several years of experimentation with this equipment has established the objectivity and reliability of the method. The technic has been found to be accurate enough to allow superposition of two or more roentgenograms or tracings of them. Since the treatment time was so short, it was found that the superstructures of the head, in the before and after treatment roentgenograms, would be superimposed exactly. This made any change in the lower facial area quite obvious and facilitated measurement.

Fig. 3.—Head in position.

In this study, the measurements were made directly on the roentgenogram. To make these measurements, the following base lines were placed under the film on the illuminating table. (Fig. 4.)

(a) NS, a line from the nasion tangent to the base of the sella turcica.

(b) MG, a line tangential to the lower border of the mandible at two points and at right angles to a line which is tangential to the anterior border of the mandible at the symphysis.

(c) NA, a vertical line from the nasion perpendicular to the base line NS.

These base lines were considered acceptable, since former cranial studies have shown that growth changes in these areas would be practically nil for the duration of treatment of any individual patient in this series, or for any other individuals in this age range.[12]

Measurements taken before and after treatment were: (a) Total face height. (b) Posterior dental height (maxillary and mandibular). (c) Mandibular incisor height. (d) Maxillary incisor anteroposterior position. (e) Mandibular anteroposterior position.

No attempt was made to select the same points for measurements on all the roentgenograms. Only on those of the same patient were identical points chosen. However, comparable points were chosen for the entire group. The reason for this was that all the roentgenograms did not show with equal clarity the same points for all the same anatomic landmarks under consideration. This procedure allowed more freedom to select the clearest, but still comparable points for measurement, and it seemed perfectly acceptable for the problem at hand to do so for the following reasons:

(a) The amount of bite opening desired in the various cases was not intended to be comparable except in a qualitative sense.

(b) The measurements of the roentgenograms of before and after treatment for the same individual were intended

to be comparable qualitatively and quantitively.

(c) Only the direction of position or growth changes was considered of significance, since the amount of bite opening had been planned to meet the needs of the individual.

(d) The amount of these changes is of significance only in respect to duration of treatment and age of the patient.

Points used in taking the measurements were:

and premolar tooth perpendicular to the base line MG.

(c) For mandibular incisor height.

From the incisal edge perpendicular to the base line MG.

(d) For maxillary incisor anteroposterior position.

From a point on the maxillary central incisor, perpendicular to the line NA.

(e) For mandibular anteroposterior position.

From a point on the symphysis per-

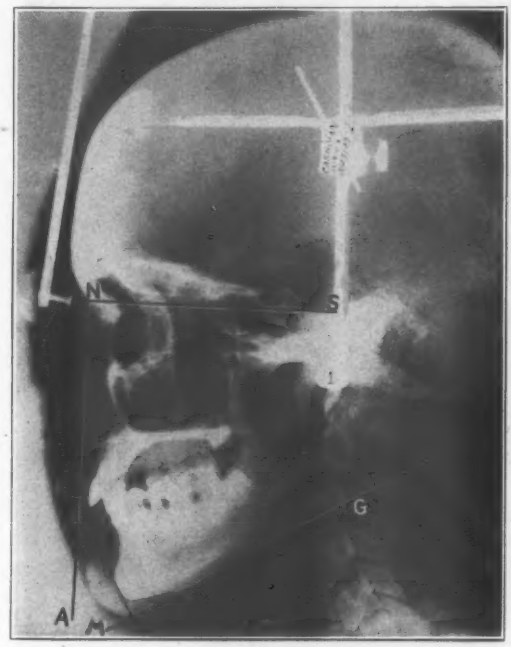

Fig. 4.—Base lines used to facilitate measurement NS, a line from the nasion tangent to the base of the sella turcica. MG, a line tangential to the lower border of the mandible at two points and at right angles to a line which is tangential to the mandible at the symphysis. NA, a vertical line from the nasion perpendicular to the base line NS.

(a) For total face height.

From a point at the symphysis perpendicular to the base line NS.

(b) For posterior dental height.

1. From a point on a maxillary molar and premolar tooth perpendicular to the base line NS.

2. From a point on a mandibular molar pendicular to the line NA.

With reference to total face height (Table 1):

All cases showed an increase in the vertical dimensions ranging from 0.1 to 4.3 mm.

With reference to posterior height (Table 1):

1. All cases showed increase in height for one or more of the four posterior teeth that were measured.

2. More maxillary posterior teeth showed increase in height than those of the mandible.

3. For the maxillary premolar measurement, seventeen cases showed a height increase ranging from 0.2 to 2.0 mm., while one case showed no change and two cases showed a decrease of 0.1 mm.

6. For the mandibular molar measurement, fourteen cases showed an increase ranging from 0.1 to 2.3 mm., while two cases showed no change and four showed a decrease ranging from 0.1 to 0.6 mm. Additional measurements in the posterior area may have proved of value since uneven vertical change in the teeth is evident.

With reference to mandibular incisal height (Table 1):

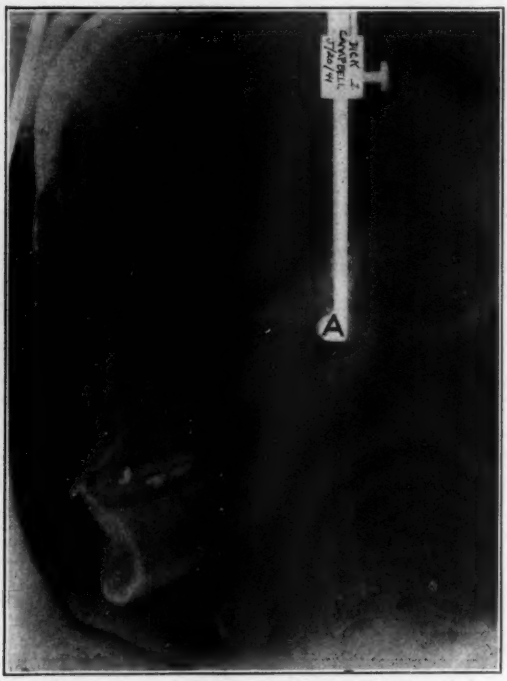

Fig. 5.—Profile roentgenogram of a patient before opening the bite.

4. For the maxillary molar measurement, nineteen cases showed an increase ranging from 0.1 to 2.0 mm., while one case showed a decrease of 0.2 mm.

5. For the mandibular premolar measurement, thirteen cases showed an increase ranging from 0.1 to 2.4 mm., while three cases showed no change and four cases showed a decrease ranging from 0.2 to 0.7 mm.

Eight cases showed a height increase, in six of which it was 0.4 mm. or less in amount, while in two it equaled 1.1 mm. Six cases showed no change at all and six others showed a decrease ranging from 0.2 to 0.9 mm.

With reference to maxillary incisor anteroposterior position (Table 1):

Three cases showed a slight protrusive change ranging from 0.3 to 0.6 mm.,

while two cases showed no change and fourteen cases showed a retrusive change ranging from 0.1 to 3.4 mm.

With reference to mandibular anteroposterior position (Table 1):

Fifteen cases showed a retrusion ranging from 0.2 to 2.6 mm., while one case showed no change and four cases showed a slight protrusion ranging from 0.1 to 0.7 mm.

interdigitation requirements of various teeth and changes in the mandibular position. Before treatment is complete, the dental vertical change is not equal for all areas, but it is difficult to determine what is responsible for this.

Figure 5 shows before and after treatment roentgenograms of a patient from this series. The major dental and facial changes are obvious.

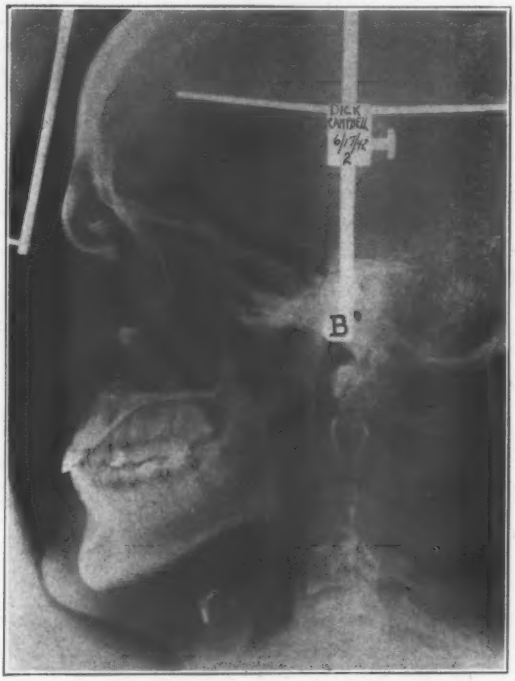

Fig. 6.—Profile roentgenogram of the same patient as shown in Figure 5 but after opening the bite. The changes in the lower facial area are obvious.

In Table 2 are shown the total vertical facial height increase, the sum of the increase in the premolar area of the maxillae and the mandible and the increase in the molar area of the maxilla and the mandible. With very few exceptions, the total facial height increase and posterior dental height increase correspond, although they are not exactly the same, perhaps because of the peculiar

DISCUSSION

This investigation reveals an increase in the posterior dental area in all cases. It also shows that there was little change in the mandibular incisal height level. Hemley[4] had found the latter to be true, but his measurements for posterior height increase were taken only in the mandible, and therefore he did not mention any increase for the maxillary posterior area.

TABLE 1.—HEIGHT AND ANTEROPOSTERIOR CHANGES (MM.)

Case	Total Face			Maxillary Premolar			Maxillary Molar			Mandibular Premolar			Mandibular Molar			Mandibular Incisal			Maxillary Incisal			Mandibular		
	+	0	−	+	0	−	+	0	−	+	0	−	+	0	−	+	0	−	+	0	−	+	0	−
1	2.0			0.8			1.0			0.6			1.1				0.0				3.4			0.4
2	2.6			0.7			1.1			2.4			2.3			1.1					0.1			0.6
3	1.2			2.0			0.7			0.1			0.3				0.0				0.9			0.2
4	0.8					0.1	0.1			0.2			0.6					0.4	0.3			0.1		
5	1.1			0.6			0.7					0.5		0.0		1.4					0.8		0.0	
6	1.3				0.0		0.2			0.2			1.0			0.4			0.6					2.3
7	2.8			1.2			2.0			1.2			1.4				0.0				0.2			1.0
8	1.7			1.3			0.8			0.1			0.4				0.0		0.6					1.0
9	0.1			0.3					0.2			0.3			0.4			0.9		0.0				0.5
10	1.2			0.8			1.3					0.2			0.4			0.2			0.7	0.7		
11	0.6			0.2			0.7					0.7	0.3					0.7		0.0				0.6
12	0.2			0.2			0.2				0.0		0.1				0.0				0.4			0.6
13	2.3			1.5			1.3				0.0				0.6			0.2			0.9			2.6
14	0.4					0.1	0.2			0.6					0.1	1.1					0.6	0.2		
15	3.0			1.5			1.1			0.4			0.7			0.3					2.8	0.2		
16	1.2			0.3			0.1				0.0			0.0		0.1					0.4			1.0
17	4.3			1.1			1.4			2.4			2.2			0.1					1.8			1.5
18	2.2			0.7			0.3			0.4			0.4				0.0				0.4			0.7
19	1.7			0.9			0.9			1.1			0.3			0.3					1.2			0.8
20	0.4			1.1			0.3			0.4			1.5					0.2	1.2					0.9

*Differences in measurements taken before and after treatment of each patient. Height changes are shown in all but the last two columns, which present anteroposterior changes.

This study also showed that, while the vertical dimension of the face was increased, there were anteroposterior changes in the mandible, mostly retrusion, and also retrusion of the maxillary incisors in most cases. Hemley's work did not include the positional changes of the mandible, which certainly affect the vertical change of the face.

With the evidence presented in this study, it is difficult to agree with Mershon that "there is nothing known to science which will correct a true close-bite during development or after maturity."[1] His definition of "true close-bite" is as follows: "In the true close-bite, the posterior teeth are short, the rami are short and the maxillomandibular muscles are correspondingly short and in harmony with the rest of the organism."[1] Granted that the muscles are not able to increase in length, there remains the possibility that they may still have some unconsumed potentiality for growth, since all other structures, as he implies, have been retarded in growth. Once these other structures have been stimulated to grow to reach their optimum, the muscles also may grow to a corresponding optimum length. Again, if the muscle had reached its optimum length while the other structures were retarded, it could be possible that the musculature is relaxed and folded upon itself and would therefore allow an unfolding and increase in tonicity as the bite was opened. Furthermore, it is possible to make use of the "physiologic rest position" of the mandible or the space between the upper and lower posterior teeth when the jaws are at rest. If the amount of the bite opening does not exceed the amount allowed by the physiologic rest position, this should not be incompatible even with Mershon's opinion of opening the bite, since the length of the muscles have remained unaltered. That is exactly what was done in the treatment of cases used for this study. In no case was the amount of bite opening more than the space allowed by the physiologic rest position. None of the patients at any time, during or after treatment, complained of any facial muscular pain or discomfort.

TABLE 2.—CHANGES IN HEIGHT (MM.)

Case	Total Facial	Maxillary Premolar plus Mandibular Premolar	Maxillary Molar plus Mandibular Molar
1	2.8	1.4	2.1
2	2.6	3.1	3.4
3	1.2	2.1	1.0
4	0.8	0.1	0.7
5	1.1	0.1	0.7
6	1.3	0.2	1.2
7	2.8	2.4	3.4
8	1.7	1.4	1.2
9	0.1	0.0	0.2
10	1.2	0.6	0.9
11	0.6	0.5	0.4
12	0.2	0.2	0.3
13	2.3	1.5	0.7
14	0.4	0.5	0.1
15	3.0	1.9	1.8
16	1.2	0.3	0.1
17	4.3	3.5	3.6
18	2.2	1.1	0.7
19	1.7	2.0	1.2
20	0.4	1.5	1.8

If this limit of bite opening has been exceeded, as may have been the case in Breitner's experiments with monkeys, this statement of his can be considered: ". . . a disharmony of muscular forces acting upon the skeleton is created, which necessarily leads to bone transformations." His histologic findings on adult monkeys can be regarded as acceptable with respect to being able to induce some changes in the mandibular form with various orthodontic devices.[7, 13] However, in the human being, it has not been demonstrated clinically or otherwise that the mandible can be mechanically altered in its shape after adulthood or even earlier. If there are changes, they might be so slight as to be demonstrable only by histologic methods, which it is difficult, if not impossible, to apply to human beings. In the pres-

ent study, it is felt that any change in the mandibular form is not gross enough to be included within the reliability of the cephalometric technic. Nevertheless, Breitner's studies[13] indicate that it may be possible to obtain major growth changes in the jaws as a whole and not depend alone on tooth movements to remedy facial deformities. Measurable change in the position of the mandible was obtained in this series, but it was not determined just where the changes took place or what was their nature.

SUMMARY

The literature presents a number of viewpoints, which may be divided into various schools of thought in determining the changes that occur when the bite is opened:

1. That the results obtained in bite opening are due only to intrusion of the mandibular incisors and there is no change in the posterior dental or other areas of the jaws.

2. That there is little if any intrusion of mandibular incisors and the increase in the vertical dimension of the posterior region of the jaws is responsible for opening the bite.

3. That there are changes in the mandibular form in addition to other changes as evidenced by animal experimentation.

CONCLUSIONS

1. Various amounts of bite opening were obtained in all of twenty cases under study.

2. A few cases showed very slight intrusion of the mandibular incisor teeth. The majority of cases showed either no change in height or some slight extrusion of these teeth.

3. Most of the vertical increase was shown in the posterior dental region. More cases showed vertical increase in the maxillary posterior teeth than in the same area of the mandibular arch.

4. Increase in the vertical dimension was accompanied by changes in the mandibular position. Fifteen cases showed retrusion, four slight protrusion and one no change at all.

5. Maxillary incisor teeth showed retrusion in fourteen patients, protrusion in four and no change in two.

The value of the biteplate for increasing the vertical dimension has been demonstrated. It is now necessary to investigate the permanence of the result after removal of the appliance. Such a study is now in progress.

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PRACTICAL CARIES CONTROL

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AFTER six years of continual use of fluoride as a caries arresting agent, a report of the effort should be of timely interest and possibly an aid to others in a similar quest.

Practicing in a fluorine area where mottling is common, it appeared that caries was less prevalent in those teeth affected than in normal teeth. Then why not utilize this effect therapeutically for relief from caries clinically?

This paper presents no review of the now copious literature,[1] but will be limited to practical use of the drug and the rationale thereof. Just how to determine the value was undertaken with full knowledge of the difficulties ahead.

The bacterial count of the saliva was decided upon as a measuring device, and, with the exception of a slight change in the medium, it is used as advocated by the Michigan Group.[1]

Natural fluorine water, as consumed by a nearby city, was used in the first probings. Later, a deep well on the farm of the late E. T. Meredith, Secretary of Agriculture, now operated by an Iowa dentist, was employed, for greater convenience. The Iowa State Department of Health was extremely cooperative in furnishing water from the different fluorine areas of Iowa, all of which were effective in proportion to the fluorine content. The highest of these is five parts per million. Later, a solution compounded by a local drug company was substituted. The results seemed of equal value, and the controlled

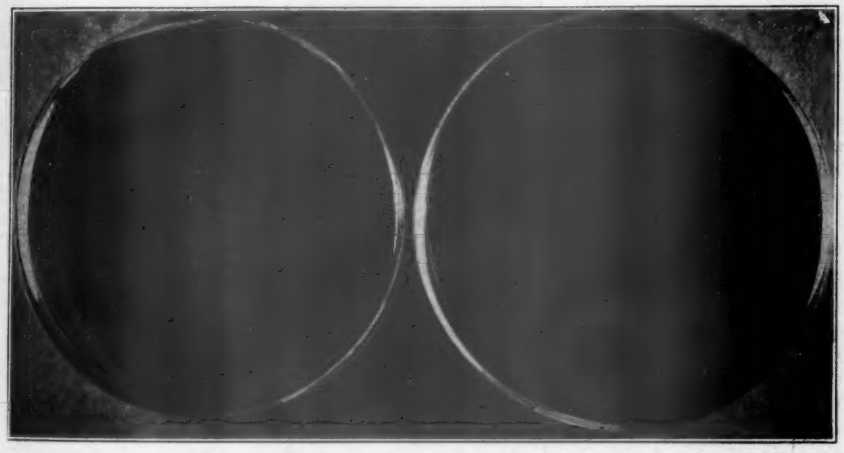

Fig. 1.—Left: Original saliva specimen, taken November 22, 1941. The count per cubic centimeter of saliva was 270,300. Right: Second specimen, taken December 5, 1941; count, 36,000. A fluorine mouth wash alone was prescribed.

strength of the solution plus the convenience induced us to use it for the remainder of the time.

METHOD

For the experiments, persons were selected from all ages, both sexes, all social groups and many different practices and localities. Dentists and physicians themselves served in many cases. The medical subjects served a double purpose. We prepared a second solution, to all appearances identical with the fluorine solution, but in which there was no fluorine. The co-workers were unaware of the switch from one to the other, but their counts varied to bear out our premise and eliminated the possibility of mere mechanical cleansing being the beneficial factor.

The experimental saliva was collected at the same time of the day. Two or more specimens, taken several days apart, were cultured and the counts averaged to form a base line for that individual.

An effort was then initiated to vary the count. Care was taken not to suggest any sort of change in the regular mode of living or habits, such as in diet and oral hygiene, other than that here given.

Immediately after eating, the teeth were cleansed by the method habitually used by the individual. The mouth was then rinsed several times with the solution, which was forced through the teeth as vigorously as possible. The remaining solution was poured over the brush and the teeth rebrushed with it. At intervals of one week, fresh specimens were taken and invariably a reduction in the count was revealed.

To aid in the work the accompanying chart, designated as the present percentage caries index, was used. This chart refers to a decayed surface as a unit instead of a cavity, which might involve several or all surfaces. With this aid, all cases can be discussed on the same plane. By this method, it was found that May 1, 1939, on a basis of 186 cases, 2,270 aciduric organisms per cubic centimeter equaled one present percentage caries index unit. After culturing 669 specimens of saliva, it was believed that the point should be nearer 1,850. This figure will undergo correction from time to time as material accumulates. The condition of the teeth can now be estimated accurately by the laboratory findings. Two years of experimentation, under all the adverse conditions that it was possible to devise, proved this unit satisfactory for measuring the results of using any remedy or method within a few days. In this short time, it is possible to control the patient to a degree by keeping his interest high and thus eliminating many encroaching diversions. One of the most valuable and practical results out of this

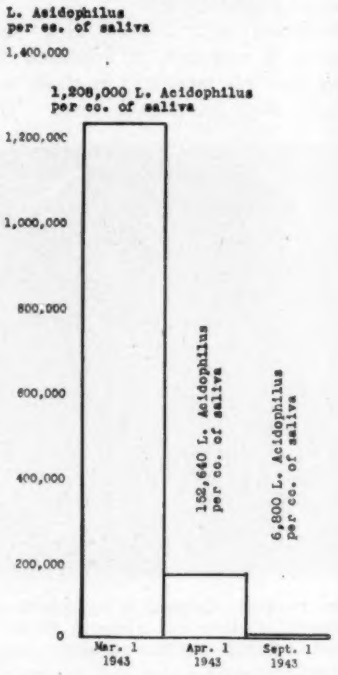

Fig. 2.—Results of complete preventive program.

work, for the clinician, is an ability to answer the question, "How often should I visit the dentist?" The statement "Visit your dentist twice a year," while better than none, can now be corrected on the basis of the findings for the patient concerned.

Experimental groups of twenty were submitted to the use of the solution, with unreliable of all patients, clinical evaluation of a method of this kind is impossible. The amount of improvement due to such other conditions as general dental service, faithfulness to instructions and the change in sugar intake cannot be ignored. However, the drop in dental fees convinces the patient and the change in number, size and kind of carious cavi-

TABLE 1.—SHIFT IN ORAL ACIDURIC CELL COUNT (L. ACIDOPHILUS AND ORAL COCCI) AND YEAST*

Patient	Original Count		Change in Count		Increase (+) or Decrease (−)			
					Actual		Percentage	
	Cell	Yeast	Cell	Yeast	Cell	Yeast	Cell	Yeast
1	92,000	0	9,000	0	− 83,000	− 0	− 90.2	0
2	13,200	1,400	54,000	200	+ 40,860	− 1,200	+ 309.5	− 85.7
3	1,000,000	4,400	3,000	10,200	− 997,000	+ 5,800	− 99.7	+ 131.8
4	1,000,000	100	369,696	0	− 630,304	− 100	− 63.0	− 100.0
5	1,000,000	1,600	279,640	100	− 720,160	− 1,500	− 72.0	− 93.8
6	1,000,000	†	13,500	100	− 986,500	†	− 98.6	+
7	1,000,000	0	300	0	− 999,700	0	− 99.9	0
8	73,776	1,700	124,020	0	+ 50,244	− 1,700	+ 68.1	− 100.0
9	1,000,000	0	6,800	0	− 993,200	0	− 99.3	0
10	204,156	†	84,588	500	− 119,568	+	† 58.6	+
11	2,200	4,900	0	0	− 2,200	− 4,900	− 100.0	− 100.0
12	1,000,000	1,200	4,200	200	− 995,800	− 200	− 99.5	− 50.0
13	204,792	0	150,732	0	− 54,060	0	− 26.4	0
14	585,120	3,100	345,100	5,400	− 239,960	+ 2,300	− 41.0	+ 74.2
15	155,820	138,648	17,000	8,900	− 138,820	−129,748	− 89.1	− 93.6
16	165,820	0	122,112	0	− 43,708	0	− 26.4	0
17	5,200	0	300	0	− 4,900	0	− 94.2	0
18	1,000,000	7,400	185,721	2,900	− 814,279	− 4,500	− 81.4	− 60.8
19	8,000,000	0	12,897	0	−7,987,103	0	− 99.8	0
20	32,436	0	134,196	0	+ 101,760	0	+ 313.7	0
Total	17,534,520	163,648	1,917,122	27,900	15,617,398	135,748	− 89.0	− 83.0
Mean	876,726	16,365	95,856	2,790	780,870	13,575	− 89.0	− 83.0

*Observations after four weeks' use of an aqueous mouth wash containing 5 parts per million of a fluoride, in twenty persons selected at random.

†Plates too overrun with yeast colonies to be counted. Cases marked 1,000,000 were much over that amount, this being a conservative estimate.

the results shown in Table I. The merit of the solution was soon evident and its use is routine. After a time, the bacterial count showed a reduction average of 87 per cent, and at this point it has remained on a standardized treatment since December 1941.

Since dental patients otherwise healthy are about the most unpredictable and ties impresses the dentist; all of which make the clinical observations of some value.

Many interesting sidelights have appeared. There were a considerable number of cases of gum chewing, excessive soft drink indulgence and employment in bakeries and sweet shops. Valuable data were also collected as to the effect of cul-

TABLE 2.—PERCENTAGE OF PRESENT CARIES INCIDENCE*

Number of Teeth Present	Number of Carious Tooth Surfaces									
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten
1	20.000	40.000	60.000	80.000	100.000					
2	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000
3	6.667	13.333	20.000	26.667	33.333	40.000	46.667	53.333	60.000	66.667
4	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
5	4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36.000	40.000
6	3.333	6.667	10.000	13.333	16.667	20.000	23.333	26.667	30.000	33.333
7	2.857	5.714	8.571	11.429	14.286	17.143	20.000	22.857	25.714	28.571
8	2.500	5.000	7.500	10.000	12.500	15.000	17.500	20.000	22.500	25.000
9	2.222	4.444	6.667	8.889	11.111	13.333	15.556	17.778	20.000	22.222
10	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000
11	1.818	3.636	5.455	7.273	9.091	10.909	12.727	14.545	16.364	18.182
12	1.667	3.333	5.000	6.667	8.333	10.000	11.667	13.333	15.000	16.667
13	1.538	3.077	4.615	6.154	7.692	9.231	10.769	12.308	13.846	15.385
14	1.429	2.857	4.286	5.714	7.143	8.571	10.000	11.429	12.857	14.286
15	1.333	2.667	4.000	5.333	6.667	8.000	9.333	10.667	12.000	13.333
16	1.250	2.500	3.750	5.000	6.250	7.500	8.750	10.000	11.250	12.500
17	1.176	2.353	3.529	4.706	5.882	7.059	8.235	9.412	10.588	11.765
18	1.111	2.222	3.333	4.444	5.556	6.667	7.778	8.889	10.000	11.111
19	1.053	2.105	3.158	4.211	5.263	6.316	7.368	8.421	9.474	10.526
20	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000
21	0.952	1.905	2.857	3.810	4.770	5.714	6.667	7.619	8.571	9.524
22	0.909	1.818	2.727	3.636	4.545	5.455	6.364	7.273	8.182	9.091
23	0.870	1.739	2.609	3.478	4.348	5.217	6.087	6.957	7.826	8.696
24	0.833	1.667	2.500	3.333	4.167	5.000	5.833	6.667	7.500	8.333
25	0.800	1.600	2.400	3.200	4.000	4.800	5.600	6.400	7.200	8.000
26	0.769	1.538	2.308	3.077	3.846	4.615	5.385	6.154	6.923	7.692
27	0.741	1.481	2.222	2.963	3.704	4.444	5.185	5.926	6.667	7.407
28	0.714	1.429	2.143	2.857	3.571	4.286	5.000	5.714	6.429	7.143
29	0.690	1.379	2.069	2.759	3.448	4.138	4.828	5.517	6.207	6.897
30	0.667	1.333	2.000	2.667	3.333	4.000	4.667	5.333	6.000	6.667
31	0.645	1.290	1.935	2.581	3.226	3.871	4.516	5.161	5.806	6.452
32	0.625	1.250	1.875	2.500	3.125	3.750	4.375	5.000	5.625	7.250

*The percentage is found at the intersection of the number of teeth present and the number of carious surfaces. Example: Teeth present, 25; carious surfaces, 6; percentage 4.800.

The percentage of present caries incidence, the number of carious tooth surfaces in each 100 surfaces of the teeth present at the time of examination and appraisal, does not take into consideration previously existing conditions as reflected by missing or filled teeth.

Since dentists credit each tooth with five surfaces, the formula by which these computations were made is $\frac{Y.\ 100}{X.5}$ = percentage of present caries incidence; e.g., if the total number of teeth present is 25 and the number of carious surfaces found is 6 (VI), the P.P.C.I. is observed to be 4.800.

tures of bacteria and their products on freshly extracted teeth and of cultures of the same material with the bacteria removed, with the acid neutralized and with the enzymes destroyed by heat.

THEORY

The theory of the action of the fluorine solution is neither original nor new. Utter and Werkman[2] have demonstrated it with relation to the propionic bac-

teria. It evidently acts as an enzyme-disturbing agent, upsetting the metabolic processes of the bacteria. Teeth with liberal amounts of fluorine deposited in them during the formative period seem to retain their caries resistance throughout life, but as yet we have no knowledge of the persistence of caries resistance of those artificially impregnated. For lack of a more descriptive word, it is explained that[3] the teeth are given an invisible coating of fluorine in a similar manner as silver nitrate is deposited.

TOXICITY

Because it is one of the violently poisonous elements, fluoride requires careful handling. In the preparation of solutions, one must keep well within the bounds of safety. The highest suggested content here is similar to that of several water supplies furnished for general consumption. Neither the drug itself nor the formula has been given to others than those qualified to handle it. Adding it to food or water for general use is beyond the practice of dentistry.

THERAPY

Dentists who are interested in caries control need not limit themselves to one favorite remedy or procedure. All likely methods may be combined.

Routine procedure in my office is as follows: The patient's susceptibility is determined by a bacterial count of the saliva. All general dental work is completed. Patients, especially young ones, must have energy foods and that means the much-discussed refined-sugar consumption. The greatest success comes from having the sweets at the end of the principal meal (dinner) of the day, with no eating between meals. The patient is instructed in a good toothbrushing technic. Silver nitrate is applied to doubtful areas. A fluorine mouthwash, to be used as above directed, is prescribed for use immediately after eating. The saliva count is rechecked in two weeks and as often thereafter as is indicated.

FORMULA

No remedy is of value unless used; therefore the mouthwash should be sweetened, flavored and colored until there is a desire to use it. These elements of appeal should be varied to please the individual.

To eliminate bulky containers and to conserve space, I make up the following stock solution:

To 4 liters of tap water, add 1 gm. of sodium fluoride. Sweeten with saccharin, flavor and color. The sweetening should be excessive as this is the concentrated solution and is to be diluted before use.

This stock solution is dispensed to patients with the instruction to use 1 teaspoonful in a half glass of water, as a mouthwash and gargle.

Many state health departments have added the facility for bacterial counts of the saliva, thus greatly simplifying the work. A definite laboratory procedure thus enables one to check the progress, impresses the patient with one's intimate interest and care and, most important, enables the dentist to recognize those disinterested and unfaithful, thus protecting his personal efforts and preventive dentistry in general.

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Euclid Avenue Bank Building.

PERIODONTIA BY THE GENERAL PRACTITIONER

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THIS paper is a composite answer to some questions about periodontia by the general practitioner of dentistry. Both questions and answers are the result of an effort shared by all the dentists of Jamestown, North Dakota. This unique group of professional men have met every Friday noon, holidays excepted, for eight years.

We are not, however, a dental study club. We are organized as the Dakota Dental Credit Bureau, Inc.* Our meetings are of great value to all of us in a professional, an economic and a personal way. We cooperate in many ways, but there is no attempt to enforce the will of the majority upon any individual in any particular. We practice in separate offices and are all general practitioners. We are graduates of seven dental colleges: the universities of Minnesota, Iowa, Illinois, Kentucky, Northwestern, Ohio and Loyola. All of us have been members of the American Dental Association since opening offices. Our practices vary from fourteen to forty-two years. The total number of years in dental service is 283.

In writing the paper, after the questions were made out, I visited each dentist and received an answer to each question. A compilation was then made and the drafting submitted for correction, criticism and additions. I am responsible for the general composition, summaries and choice of quotations from the dental literature. I am also responsible for the arrangement, which follows my personal bias. The aim is to emphasize what is considered good procedure, recognize half truths for what they are, in the candor of genuine friendship and with the objectivity of progressive science, and to bring into clear focus the field where the general practitioner and research worker in periodontia now stand. The excellent service of the American Dental Association library was relied upon for dental literature.

The paper will be presented in three divisions. In the first part will be most of the questions asked the dentists. The answers will be given as direct quotations or brief summaries. In the second part, before giving replies to the critical questions of the series, there will be inserted some general impressions gained from the interviews and the recital of an interesting bit of chronology associated with the recent history of periodontia. Finally, in the third part will be a brief suggestive conclusion.

The questions were as follows:

1. (a) Do you refer patients to periodontia specialists?

Six said "No"; three, "Some or a few." When the case was referred, the results were considered good.

(b) Do you consult other medical practitioners in treating periodontic diseases?

Patients are referred from dentists to physicians and from physicians to dentists. In some cases, patients have been

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referred immediately upon examination to the physician. Cases are reported in which anemia, leukemia, cancer, diabetes, syphilis, high blood pressure and scurvy were found upon general examination. Many of these cases were referred at once because, to the dentists, the mouth conditions did not look like the usual type of pyorrhea. In many cases, if the results of dental treatment "do not come out as they should," the patient is referred to the physician.

There is no consultation with physicians to determine either the presence of or the type of periodontal disease. There were some statements that physicians do not know "too much" about gingival conditions.

(c) How effective has this consultation service been?

The relationships are cordial, but it is generally admitted that there could be a closer follow-up. One dentist says medical men are not greatly interested unless they see the patient first. Some physicians look askance at low-grade chronic cases. Generally speaking, physicians do not recognize types of periodontal diseases. Pyorrhea is just pyorrhea.

2. (a) Do you consider periodontal diseases usually a cause or an effect of systemic conditions?

Answers by dentists: "Can be both." "Usually a cause." "One type, the filth type, causes systemic disturbances." "Can cause systemic disturbances, but there are periodontal conditions that are indications of systemic disease."

Two of the group think there "is one condition called pyorrhea." A physician says, "Pyorrhea is pyorrhea," just one disease. One dentist says, indefinitely, there are several causes. An internist agrees with the majority of dentists; namely, that periodontal disease may be either a cause or an effect of a systemic disturbance.

Most of us usually think of calculus as a local cause of periodontal disease. One dentist pointed out that he was taught and he now thinks that calculus formation, certainly in excessive amounts, is itself an indication of systemic disturbance. Other dentists used the term serumal calculus in such a way as to imply some systemic relationship.

No particular mention was made of the possibility that different relationships might exist between the inflammatory type and the atrophic types of periodontal disease and systemic conditions.

(b) Have you any factual evidence of hereditary or family tendencies toward periodontal disease?

One has a record of two families in which "the type of disease is practically identical," but he believes the cause to be environmental. One says that if malocclusion is a factor in pyorrhea, heredity is a factor. One believes that his own family showed a type which was hereditary although he thinks that similar environments may be a factor in producing likenesses. Three think that there are no hereditary tendencies, and one says that all pyorrhea is the result of irritation. One says that there is the probability, and another, a possibility, of hereditary tendencies. No factual proofs were presented.

3. (a) Do you use the x-rays in all cases wherein you treat periodontal diseases by scaling? All answer, "No."

If not, how do you determine when to use the x-rays?

"If deep pockets are found." "When a pocket is discovered or when the response is not good." "If the case fails to progress to a reasonable extent, then use the x-rays." One says, "X-rays could be used in all cases, but cannot help much." One uses them when, by probing, he concludes that he cannot see enough.

(b) What is the value of the roentgenogram in diagnosis of periodontal diseases?

Five dentists think that the depth of the pocket is all that can be determined.

One sees depth and amount of destruction away from the pocket. One uses it particularly to determine traumatic occlusion. Three dentists mentioned that the thickness of the peridental membrane, the density or clear definition of the lamina dura and the extent and density of the shadow of the interproximal bone were considered in reading roentgenograms. All agreed, in discussion, that these shadows and densities might have significance. None of us are fully informed in regard to complete histologic accompaniments.

(c) Of what value is transillumination?

"It helps to disclose subgingival tartar deposits."

4. What has been your experience with caustic chemicals, electrocoagulation, electroresection, ultraviolet ray, conservative surgery, radical surgery and subgingival curettage in treating periodontic diseases?

No experience with electrocoagulation, electroresection or radical surgery. One dentist had used a physician's ultraviolet ray and, in test cases, in which the whole mouth had been scaled, the side of the mouth treated with ultraviolet showed definitely accelerated healing. Five offices reported some conservative surgical operations. All report the advantage in vision to clear away deposits. The results were considered good in all cases. Only one operator reported bone curettement with use of his own pack.

All had had more or less experience with caustic chemicals. The older practitioners had "tried everything." No one holds now that pyorrhea is primarily a bacterial disease or that it can be cured by using bactericides. One mentioned using lactic acid.

Unless chromic acid 0.7 per cent is considered caustic, almost all caustics have been discontinued. Some unhappy results were mentioned in the treatment of Vincent's infection with caustics. Trichloracetic acid is used in most offices, but, as one said, "when the tooth is about ready for the forceps." In four offices, trichloracetic acid and some iodine astringent have been used with fair to good results. No operator uses them routinely.

All dentists use subgingival curettage. This is the *sine qua non* of periodontal treatment. Every operator emphasized that the more carefully this wearisome work is done, granted cooperation on the part of the patient, the more successful the result.

When asked what instruments were used in subgingival curettage, most operators replied "About six." Every dentist had numerous instruments in his cabinet or office. One said that this merely indicates lack of sales resistance to supply men who presume to give postgraduate courses. All dentists thought that probably not more than a dozen different instruments were used in a year's time.

5. In determining whether to extract the teeth or treat a case for periodontoclasia, are you influenced by:

(a) The patient's economic circumstances?

Answers: "Not too much." "Not necessarily." "Don't think so; do what's best." "No, try to save the teeth." "Somewhat." Four say, "Have to be."

(b) His habits of mouth hygiene? Unanimously, "Yes."

(c) Your estimation of your ability to change those habits?

All said yes, and all would agree with the one who said, "Our abilities are quite limited in this respect."

(d) Recent improvement (last ten years) in prosthetic appliances? Five said "Don't think so," and others said that they were saving more teeth now than formerly because better partial dentures are being made.

(e) The systemic condition of the patient?

All dentists very definitely take into

consideration the systemic condition of the patient in making the diagnosis and plan of treatment, and all of them stated that they so informed the patient. All operators believe that there is a possibility of focal infection due to periodontoclasia and all cite cases in their own practices wherein, to them, the causal connection was clear.

6. (a) After you have treated patients for periodontoclasia, how successful are you in obtaining cooperation for periodical prophylaxis?

Answer: "Not so good, 10 per cent." "Very poor, 10 per cent." "Varies," 10 per cent. "Very poor, 5 per cent." "You don't get it, that's all," possibly 10 per cent. One said 50 per cent. Another said, "Varies, usually very cooperative at first, but they do drift back to carelessness." In my practice, of 200 patients coming in for dental prophylaxis in 1924, 125 returned in 1925, eighty-seven in 1926, ninety in 1927 and fifty in 1928.

(b) Do you have any specific recommendations for patients as to home care?

All operators instruct in toothbrushing, some quite specifically. Two emphasized tissue stimulators; several, finger and toothbrush massage of gingival tissue. Two mentioned use of mild mouthwashes. One emphasized the time element in brushing, three minutes twice daily. One mentioned instruction in diet and the necessity of keeping the bodily resistance up. Most dentists would admit that time spent in instruction might depend on the "rush of business."

7. (a) What is your reply to the patient who asks, "Can pyorrhea be cured?"

Answers: "Definitely, no." "No, except in early stages. After it gets to going, there is no chance." "It can't be cured, just arrested." "I don't promise a cure." "It can be checked if you cooperate properly." "It can be prolonged." "It depends on the progress of destruction. It's like cancer, if taken early enough, there is a good prognosis." "It depends on the type of pyorrhea that you have and at what stage you have arrived."

(b) Do you tell your patients that treatments reestablish normal conditions or merely arrest disease processes?

No dentist tells his patients that he can do anything more than arrest the process. No one thought that he could bring about the reattachment of the peridental membrane.

8. What has been your experience in the use of drugs in vitamin therapy by your own prescription or under control of the internist?

Four have not prescribed vitamins; two others have not given enough or followed closely enough to express opinions. One has given a few "shotgun" prescriptions. One says that he thinks a dentist best qualified to give prescriptions of vitamins for gum conditions, but he made no specific recommendations. Another says he writes prescriptions for vitamins where indicated —that it increases the prestige of the dentist in the patient's mind if the dentist writes his own prescriptions, but that their value may be overestimated. One thinks that the vitamin B complex has helped certain cases, neurotic in type. At the state hospital for the insane, where sodium dilantin is given in epilepsy cases, the dentist now prescribes 50 mg. of nicotinamide three times daily, and has several cases apparently under control. There have been cases of gingival hypertrophy resembling Vincent's infection. Nicotinamide therapy does not have the unfavorable reactions that nicotinic acid does.

All the dentists talk in general terms to their patients about the value of vitamins in the diet. Except for two opinions expressed above, the other dentists think vitamin therapy should be handled by the internist, although they state that as yet they have not checked

their cases closely enough to determine any specific results. According to the belief of one internist, the vitamin advertisers have done such a good job that we may soon find overdosage rather than deficiency.

In Beckman's "Treatment in General Practice (1942)," there is a paragraph directing the internist's attention to "The New Dilemma." Beckman says:

> We are currently in an era of brilliant achievement in the nutritional field, and, as always in such circumstances, the literature has become very voluminous, complex and confusing. But already the leaders in the clinical phases of this work . . . are clearly stressing two facts: (a) the classical deficiency disease entities all have their subclassical phase which it is of utmost importance to recognize; (b) deficiency in a single nutritional factor is rare, i.e., most of the syndromes as seen by the practitioner are multiple and not single deficiencies. Add to these the third fact, namely that in the current state of our knowledge the diagnosis of a subclassical deficiency must be made in practically all instances without the aid of either methods or instruments of precision and we face a dilemma indeed. And one thing more I state: the evasion of responsibility through the administration of proprietary mixtures of vitamins to any patient who looks a little peaked is shameful.

We come now to the second part of this study. What has been your reaction to the answers thus far? As I made the survey, I became conscious of two general impressions. The first was a sense of futility on the part of the dentist as he thought about periodontia. But the difficulties seemed to arise from different sources with different practitioners. With some, this sense of impotence seemed to be mainly a problem of social control; i.e., how to get the patient early enough and how to keep his cooperation in order to control conditions. All the dentists agreed that something beyond education at the dental chair is required if timely cooperation is to be secured.

With some dentists, this sense of futility seemed to arise also because either the cause of the diseases or their processes were pretty much of an unfathomable mystery. The older practitioners mentioned various panaceas, or theories, or treatments that they had tried through the years and abandoned. That there has been developed within the last two decades a new approach to the whole problem which gives a rationale to established technics, promising progress in both diagnosis and treatment, was not acknowledged particularly.

As I tried to find the cause of the futility problem, the other general impression grew. It was this: In discussing periodontia, words and terms do not mean the same thing to different dentists. We are like the American soldiers landing in Britain who think they speak the English language. When they meet the Londoner, they find that simple words have quite different meanings in America and in England. Some one has to explain those differences.

If practitioners of dentistry, including teachers in universities, do not conceive and teach normal relationships between the teeth and paradentium somewhat similarly, how are they to understand one another in discussing pathologic conditions or differential diagnosis as a basis for treatment?

Just to show how scientific truths in our dental science spread or do not spread, let me cite some chronology dealing with Gottlieb's conception of the gingival crevice. All of us in this survey testify that we were taught to conceive of the free gingiva as the normal between the soft tissues and the tooth crown. When this survey began, most of us still held that conception.

In November 1934, C. F. Bodecker wrote as follows in the *Dental Cosmos:*

> Gottlieb showed the fallacy of the existing conception of the gingival crevice. This was the first step toward changing the erroneous view still held concerning this structure. Fol-

lowing Gottlieb, the work of Orban and Mueller, Kronfeld, Becks, Weski, Skillen and others has done much to convince teachers of the essential correctness of Gottlieb's observations. The next step remains to be accomplished, that of setting forth in definite terms this new conception and of bringing it before the members of the dental profession. It is of practical importance that dentists realize the true structure of the gingival crevice. Orthodontic and operative [presumably he took for granted periodontic] procedures may be influenced by the new view.

Kronfeld gives us these significant dates:

Gottlieb gave the first description of it [the epithelial attachment] in 1921 and in an article by Prinz (1926) these findings were first mentioned in American literature. Skillen and Mueller were the first ones in the United States to give a correct description of the gingival crevice and epithelial attachment using their own histological specimens (1927).

One of our group was graduated in 1923, another in 1929. Neither of us as undergraduates heard of Gottlieb's observations. In 1933, I was called upon to teach a class of nurses. My typewritten notes taken ten years before and Lewis and Stohr's "Textbook of Histology" were then considered inadequate source material. By good fortune, I chanced to purchase Kronfeld's Histopathology of the Teeth and Their Surrounding Structures." I have never read a book that gave me more useful professional information. This work revolutionized my thinking in more ways than one, perhaps because ten years' experience had taught me "what I did not know."

This work was mentioned to the dean of a dental college a few months later, but he did not seem particularly enthusiastic. In 1934, Bodecker's article quoted above was published, and subsequently articles and books of similar tenor appeared. In 1939, a teacher of orthodontia, soon to be retired after fifty years service, but then active on a college staff, called at my office. He was asked what he thought of Gottlieb's observations and Kronfeld's clear exposition. It is my impression that that teacher then held to the free gingiva idea and recognized no particularly new ideas coming from research. In 1941, a lecturer on periodontia from another university on our state program left me with the same impression. Neither his classification nor his descriptive material indicated any new observations clarifying periodontic problems.

The untimely death of Dr. Kronfeld prevented my state from having his services on our program in 1940, but Dr. Bernhard Gottlieb was with us in Jamestown in 1942. Concerning his work, it was stated in our program that

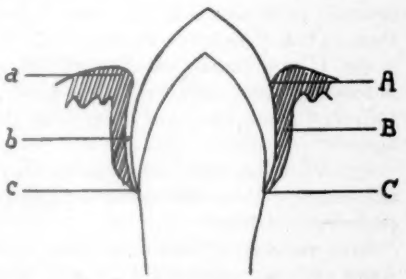

Fig. 1.—Showing old and new conceptions of the attachment of the gingival tissues.—Kronfeld.

the dental research of Dr. Gottlieb is on a par with the work of W. D. Miller, G. V. Black and William Hunter.

Let me ask your conception of the gingival crevice, the epithelial attachment and normal gingival conditions?

I hope that I have not cited this chronology as a supercilious cynic, twisting perversely Aristotle's devotion: "Dear to me is Plato, but dearer, Truth." I love my profession dearly, all the way from the fellow who practices next door to me to the dean of my Alma Mater, and I realize full well the lethargy that besets me. We may talk about

dentistry being a part of medicine—a biologic science—but the plain facts are that it is very difficult to think, work and make progress in that direction.

Neither have I cited one observation of Dr. Gottlieb as the only significant contribution which either he or other scientists have contributed to periodontia in the last two decades, but I do think that Dr. Gottlieb's anatomic studies should be known by all general practitioners.

Let us proceed to the last questions of this survey, actually basic questions dealing with how the general practitioner now classifies periodontal diseases.

9. (a) In your routine, how do you classify types of periodontal disease? For example, do you distinguish between (1) filth pyorrhea including gingivitis; (2) systemic pyorrhea and (3) acute infections such as Vincent's infection?

(b) If you classify more in detail or differently from this, will you give a sufficient description for differential diagnosis?

(c) What are the distinguishing characteristics of local and systemic types of periodontal disease?

The answers to these questions were quite varied, sometimes vague and rather mixed. The first question was badly framed: it contained too much suggestion. After it was asked, every dentist rather fell into line with it, although, in further discussion, I could not find a clear-cut differentiation into the three forms suggested. In some measure, every dentist seemed to "feel" difference in types. As already mentioned, the idea of the free gingiva was still held and most dentists said that the attachment of the epithelium was, they thought, at the cemento-enamel junction when normal. One said, however, that the gum was attached to the bone, not the tooth; that, in gingivitis, this attachment is present, but, in pyorrhea, it is being progressively destroyed. One said that in health the gum is not attached, but, in disease, it is attached to the tooth. His evidence was that when teeth are extracted something comes out attached to diseased roots. One dentist mentioned that Vincent's infection is certainly "not pyorrhea" while another at times seemed to talk about chronic Vincent's infection as if it were the systemic type of periodontic disease. One operator gave his classification as "gingivitis" and "chronic suppurative pericementitis." He outlined definitely the process in this type of disease. He considered gingivitis the introductory stage, but stated that, according to his training, if the disease was not chronic (long standing) and suppurative (pus exuding) and if the peridental membrane was not inflamed, it was not "pyorrhea." This dentist kept in the foreground in discussing the relation between local irritating and general systemic conditions as affecting cell resistance.

Three further questions arose from this interview: 1. The first was what systemic diseases cause early periodontic disturbances. Since these are commonly listed as deficiency diseases or obscure blood dyscrasias, or possible endocrine disorders, it appears that the dentist and physician may come very close together in attempting to recognize the subclassical phases mentioned previously by Beckman. This requires more than a superficial knowledge of vitamins and cell metabolism, and demands the unremitting use of unusually acute powers of observation.

2. The second question that arose concerns the peridental membrane. The term pericementitis, like the word pyorrhea, has a history of usefulness, but it is misleading now because dentists use it differently. Some use it as an inclusive term to indicate a group of conditions, whereas others think of it specifically as inflammation of the peridental membrane. Apparently, modern investigators do not think about the subject of the peridental membrane as once taught. For

example, Thoma and Goldman (Harvard, 1937) say: "In the marginal type of parodontal disease (parodontitis), the peridental membrane is not affected except by a gradual progressive disintegration as pocket formation increases and bone is resorbed. Otherwise, there is no evidence of alteration in our histologic sections of this type. . . . In parodontosis, this structure (the peridental membrane) is always free from inflammation." E. D. Coolidge says: "The popular opinion that chronic inflammation of the gingival tissue causes the development of a periodontal pocket, spreads directly into the periodontal membrane and destroys the principal fibers is not substantiated by histologic study of laboratory material."

Apparently, it is the duty of all of us to find out exactly what modern research is discovering. This will guide us to rational procedures. Certainly, anything I have found to date merely enhances the value of conservative, hygienic procedure.

3. The third inquiry aroused by the use of the term "chronic suppurative pericementitis" involves the differentiation of periodontic disease into types. This is not an inclusive, but an exclusive term: it does not describe all periodontic diseases. Kronfeld considers Black's use of it as synonymous with Gottlieb's "paradental pyorrhea," which I understand is a mixed syndrome.

During this survey in differentiating types of periodontal diseases, the youngest dentist in the group indicated that he did not recall being taught, but he soon learned from observation that there is a "dirty" and a "clean" type. Every operator gave some indication of observing this variation.

For detail, one dentist mentioned that "filth" pyorrhea proceeded in four stages: inflammation, hypertrophy, suppuration and withdrawal of the tissues upon reorganization. Gottlieb's observations supplement this and also call attention to normal physiologic processes when he says:

> Chronic gingivitis may also be the cause of the gingival margin not following synchronously the bottom of the pocket. Every inflammation involves a hypertrophy of the tissue attacked, while the following of the gingival margin involves atrophy. Hypertrophy and atrophy cannot proceed simultaneously in the same tissue.

One operator said of chronic suppurative pericementitis that it begins with irritation caused by trauma, calculi (salivary or serumal), drugs, mechanical obstruction or ill-fitting dental appliances. Steps that follow are inflammation, infection and looseness of the teeth. Several dentists, however, said that they had observed well-kept mouths that developed pockets very quickly. Gottlieb's remark, made in Jamestown, about this phenomenon, associating it with cementum dysfunction, was mentioned by several.

One dentist listed details in differential diagnosis as follows: For Vincent's infection: characteristic odor, white sloughing tissues, extreme tenderness of the gums, raw bleeding surfaces, history of sudden onset, the gums, standing away loosely from the teeth and withdrawal of interproximal tissue, making a truncated cone or giving a hollowed-out appearance. For filth pyorrhea: thick tartar deposits, inflamed tender gums, foul breath, ready bleeding of the gums when touched and pus pockets. For the other type, called "cleaner": softer deposits, slight inflammation, not such foul breath, pressure required before bleeding.

This dentist did, however, associate looseness of teeth with the filth type, whereas we understand that looseness of the teeth occurs as the end-result in the pure form of filth pyorrhea.

Modern investigators apparently agree now that there are two classic types of periodontal disease. The one type, *parodontitis,* primarily a local inflammatory

process, beginning with gingivitis, is much more prevalent. In the pure form, its prognosis is favorable up to the late stages. It is the one associated with local irritation and, as Dr. Berman recently stated, "Systemic health and local tissue resistance are definitely important in determining the amount of damage that these local irritations will cause. However, the systemic factors are of secondary importance." Dr. Coolidge says: "The elimination of the pocket and the institution of proper mouth hygiene are the only means of checking the vicious cycle."

The second type of periodontal disease is not primarily inflammatory, but is atrophic or degenerative. Under the term *parodontosis,* I now group all atrophies of the paradentium excluding that caused by inflammation. This would include physiologic alveolar atrophy, which occurs with advancing age, senile atrophy or, if too early in life, presenile atrophy; that caused by too much or too little pressure—abnormal pressure atrophy, and diffuse atrophy of alveolar bone, due to a systemic disturbance. It is the last condition that is recognized and described as "diffuse alveolar atrophy" by Gottlieb, "paradentosis," by Becks, "rarefying pericementitis fibrosa," by Box, and as "vertical pyorrhea" and as "wandering pyorrhea" by others.

To quote Simonton:

> By the term parodontosis, we intend to designate a condition characterized by a retrograde metamorphosis of the parodontal bone, but in which inflammation, if present, is secondary or sequential. The systemic parodontosis has been called diffuse atrophy by Gottlieb and *parodontoclasia obscura* by me. It is the most recondite condition with which we have had to deal in the treatment of "pyorrhea," for the local factors have been absent or inconsequential and the dentist has had no knowledge leading to any rational attempt at its control. Gottlieb, as has been stated before, believes that "it is surely due to some systemic factor." Elsewhere, he expresses the opinion that this systemic factor is not a constitutional factor. We believe that it is nutritional.

Becks says of this type:

> In my opinion, every case of unquestioned paradentosis diagnosed clinically should be referred to the internist for critical examination. It is a disease of the paradentium. It should be treated by the dentist. The part to be played by the physician is to diagnose and treat the underlying disease.

Hatton focuses our attention thus:

> Perhaps I am unduly influenced by the opinions and observations of two men, namely, G. V. Black and Bernhard Gottlieb, and if I have truly understood them, I think that both believe that in the peculiarities of the cementum and its reaction to local and systemic changes is to be found the way to the solution of the pyorrhea problem.

Apparently this *atrophic parodontosis* type of pyorrhea works the same kind of havoc among dentists in their periodontic problems that poor credit risks do in their business. Until our Jamestown dentists studied the facts, these poor credit patients created various problems, coloring our whole attitude toward all credit patients, and even toward dentists. Now we handle these delinquents as a class by themselves, and together we work out specific treatments for them individually.

Just so in periodontia, the general practitioner has not recognized the specific type, *parodontosis,* and has gone on treating it or mixed types just as he treated parodontitis. Some statistics are given that 80-90 per cent of our cases are parodontitis. But there are mixed types, and some cases, possibly in our best patients, strictly parodontosis. The unsuccessful results with a few cases should not color our whole attitude toward periodontia.

We may make two clear-cut distinctions: In dealing with gingivitis or *parodontitis,* it is good medical thinking to consider the interplay between the viru-

lence of the invader and the systemic resistance. But this is quite different from thinking about *parodontosis* as a condition arising before inflammatory action, and due to systemic influence upon cementum, peridental membrane and/or bone.

The fact is that today the general practitioner and research worker must meet mentally. The clinician needs to see as much as he can in his mind's eye of what is actually seen through the microscope by the investigator. What are normal tissues, normal relationships, normal processes? How do normal and abnormal conditions proceed? How particularly do the processes in *parodontitis* differ from those in *parodontosis?* Having these facts, when we come to treat periodontic diseases, even mixed types, our methods will have a rational basis.

And now since the Jamestown dentists were good enough to carry through this survey with me, may I conclude by asking you:

1. Is it not about time that, as general practitioners, we agree concerning descriptive words and normal periodontic conditions?

2. Can we accept the terms *parodontitis* and *parodontosis* as both descriptive and useful?

3. Is there any reason that the dental surgeon and the dental scientist should be any farther apart than we expect the general surgeon and the pathologist to be?

4. Can we, by friendly association in local communities, overcome war handicaps when scientific meetings are cancelled and still keep abreast of our times?

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ULCER OF THE LIP FOLLOWING LOCAL ANESTHESIA

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REPORT OF CASE

A girl, aged 7 years, seen at one of the dental clinics under the auspices of the Health Department of the City of New York, complained of severe pain in the region of the lower left deciduous molars. Visual and roentgenographic examinations revealed deep seated caries and pulp involvement of both deciduous teeth. One cubic centimeter of procaine solution with cobefrin (1:10,000) was administered locally for infiltration anesthesia and the offending teeth were removed. The following day, the patient returned with an ulcer on the inner surface of the crest of the lower lip, immediately in front of the lower left deciduous lateral incisor and cuspid. The ulcer had the appearance of a large bulla, raised above the surface of the lip. (Fig. 1.)

COMMENT

Several authorities who have written on this subject hold the following varied opinions as to the relationship between this particular type of ulcer of the lip and the extraction of teeth under the effect of a local anesthetic.

Nevin[1] has stated that this swelling or blister of the lip may be brought on by pressure exerted on the lip, during either injection of the anesthetic or removal of the tooth, but he cannot reconcile his hypothesis with this condition when the ulcer appears on the upper lip, where pressure is a negative factor.

M. H. Jacobs,[2] of Boston, attributed the condition to either a vascular spasm due to the hyperactivity of the sympathetic nervous system, the result of irritation, or trophic and secretory nerve influences. Dr. Jacobs expounds his first theory as follows: Epinephrine, which is commonly used as a vasoconstrictor, acts on the plain muscles of the arteries and arterioles, a transient vasoconstriction followed by vasodilation resulting, of such extent that a transudation of serum takes place with the formation of one or more vesicles. His second theory is that the action of the trophic fibers of the mucous glands of the lip sets up metabolic changes producing mucin. Since the epinephrine in the local anesthetic has a direct influence on the sympathetic nervous system, of which the trophic fibers are a part, there may be an overproduction of mucin, which breaks through the superficial mucous glands of the lip, raising the epithelium and creating a vesicle.

William A. Cook,[3] of Detroit, believes that these lip disturbances are herpetic lesions, traumatic or dysfunctional in origin. Either the peripheral nerve filaments are traumatized by stretching or

brushing the lips, producing an irritation to the nerve terminals, which, in turn, causes the inflammation, swelling and formation of coalescing vesicles of herpes labialis; or that these lesions may be the result of a disturbance of the normal action of a sympathetic nerve trunk causing a dysfunction of the terminal filaments and the resultant herpetic ulcer.

Mead[4] refers to the same lesions as neurotrophic ulcers appearing on the lower lip near the angle, after extraction of teeth under local anesthesia. He writes:

The ulcers appear the day following mandibular injection and vary in size from that of a dime to that of a quarter. They are not painful and have the appearance of a circumscribed piece of pearly white tissue superimposed on the epithelial tissue. They are probably due to irritation of the nerve in a susceptible person or to a solution which is too hot.

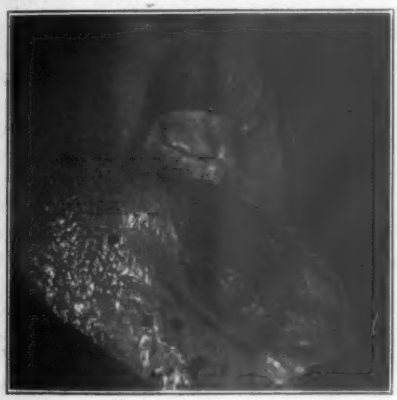

Fig. 1.—Ulcer of lip, following local anesthesia.

Today, most dentists use carpules of local anesthetics prepared for immediate use, instead of boiling anesthetic tablets in Ringer's solution, the old method. We can, therefore, eliminate the "solution which is too hot" as an etiologic factor. While the various theoretical causes mentioned previously cannot be minimized, it is the consensus of opinion in the Dental Division of the Health Department of New York City that irritation and trauma are the causative factors in the production of these ulcers, and that the trauma is self-induced after the extraction by constant biting and gnawing of the lip under the influence of the local anesthetic.

It is interesting to note that, in 1940, according to the Annual Report of the Department of Health,[5] 43,056 deciduous teeth and 8,058 permanent teeth were extracted, and only four patients were reported to have returned with ulcer of the lip after the extraction of teeth. A careful investigation of the case histories of these four patients revealed that, in every instance, the patient had unconsciously gnawed at the anesthetized lip, with the resultant formation of a bleb or ulcer. While these ulcers of the lip occur very infrequently, their appearance is alarming to the patient and sometimes even to the dentist. It is therefore important to make the patient fully cognizant of the possible sequelae of constant nibbling and biting of the lips after administration of a local anesthetic.

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A THEORY OF ESTABLISHING THE PLANE OF OCCLUSION FOR BOTH DENTULOUS AND EDENTULOUS PATIENTS

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THE purpose of this paper is to point out the existence of a common basic functional pattern of the dentition and to show how this pattern can be used to determine spatial relationships of the dental structures.

In Figure 1, the common basic functional pattern just mentioned is related to a skull to show the relative positions of the planes, axes, centers and sphere necessary to explain denture relationships.

Nature invariably has a basic plan of forming the skull according to a certain growth pattern. If this underlying growth pattern always were to develop harmoniously, the dentition would always assume the same position relative to the skull structures. Rarely, however, are we privileged to work with even the nearly perfect specimen because of adverse influences of heredity and environment. No two skull formations are precisely alike; but, in every case, at least rudimentary traces of the basic growth pattern remain. In other words, the common basic growth pattern is never completely lost.

In the development of the skull, Nature follows biologic laws; but, in effecting function, she follows physical laws. We know something about physical laws and can apply them in mechanics. Therefore, our only avenue of approach in the establishment of denture relationships is the functional element, because we cannot control biologic laws in skull development.

By observing the movements of the mandible, as in chewing, opening and closing, and recording movements, such as the gothic arch tracing, the functional activities of mastication can be visualized, and an ideal conception of the mechanical principles which produce these movements can be blueprinted. This blueprint would then represent a plan of the ideal machine, which is here represented as the common basic pattern. This basic pattern consists of a sphere and angular lines which form centers, axes and planes. It automatically supplies the sphere, centers, planes and axes within the skull when it is correctly oriented.

To use this basic pattern as a norm, two factors must be taken into consideration: size and orientation. We expect the functional activity to be in proportion to the size of the person. For example, the tall man can take a longer stride than the shorter one. Thus, his walking pattern is larger. This also is true in masticatory function: in order to know the size of the chewing pattern, we must know the size of the anatomic structures.

This individual quality of size is determined by measuring the distance between the hamular spines and by using this measurement as a unit for a 1:3 ratio in constructing the basic pattern. It should be understood that this basic pattern is common to all cases, except that it is larger or smaller according to

Read at the Seventy-Ninth Annual Midwinter Meeting of the Chicago Dental Society, February 23, 1943.

the individual measurement of the hamular spines. The hamular spines are small pointed projections of the sphenoid bone which can be palpated adjacent to the maxillary tuberosities. In addition to their use as a unit of measurement, the hamular spines are also used in conjunction with the palatal raphe to orient the basic pattern to the skull. The palatal raphe is represented as a line located in the sagittal plane of the hard palate, which extends approximately from the middle of the palate to its distal border.

Orientation of the basic pattern is accomplished by angular measurements, which can be seen in Figure 1. Given the proper size of pattern, it is placed in position to fit the tips of the hamular spines as shown at HS. The vertical line of the pattern is adjusted to form a right angle with the palatal raphe, PR. This union establishes the transverse vertical

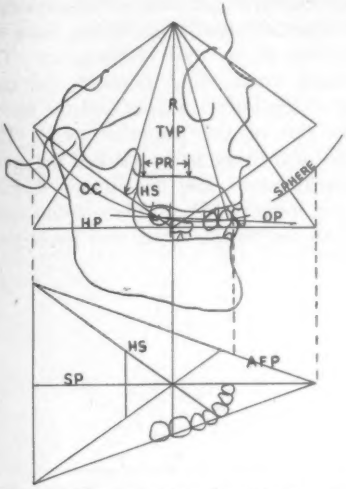

Fig. 1.—Common basic functional pattern related to a skull to show relative positions of planes, axes, centers, sphere and normal positional relation of occlusal plane as viewed in sagittal plane.

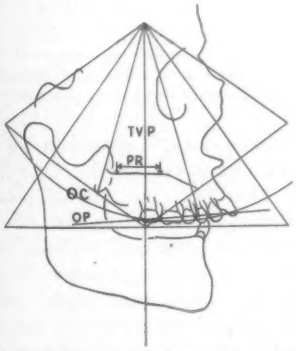

Fig. 2.—Forward position of first molar in respect to transverse vertical plane, showing downward inclination of occlusal plane.

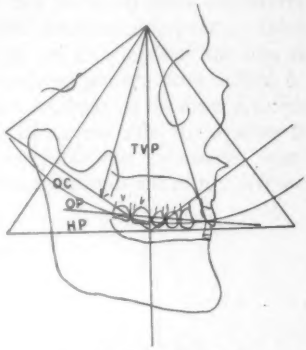

Fig. 3.—Distal position of first molar in respect to transverse vertical plane, showing upward inclination of occlusal plane.

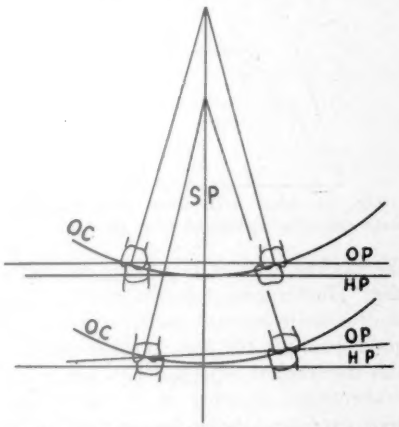

Fig. 4.—Correct and incorrect positional relation of occlusal plane as viewed in transverse vertical plane.

and horizontal planes, TVP and HP. The sagittal plane divides the distance between the hamular spines and is at right angles to the horizontal plane, SP, in the lower drawing. These directions in a general way outline the method of orientation.

Comparison of the patient's mandibular movements with those of the basic functional pattern substantiates this approach and the accuracy of its application. A gothic arch tracing produced by the subject is retraced by the basic fundamental pattern, or vice versa. In order to obtain accuracy, the skull in this drawing was cut in the sagittal plane and the outline scribed to obtain the exact size. The structural development of this skull is quite normal, and it represents a good example for the demonstration of this mechanical concept. This figure is a midsectional drawing of the basic pattern, excepting the occlusal curve for the teeth, OC, which is shown in its correct elevation relative to the horizontal plane as it follows the teeth in the arch from the central incisors to the second molar.

Since the teeth are progressively farther from the median line anterioposteriorly, the occlusal curve will be upward at the posterior end relative to the horizontal plane. The plane of occlusion is generally defined as a plane which passes between points representing one-half of the incisal overbite and one-half of the cusp height of the last molars. This definition has a general application, but, because it establishes a mean, it does not meet definite requirements for a description of occlusal relationships. The occlusal curve, OC, contacts the cusp tips of the lower incisors and the buccal cusp tips of the posterior teeth. This curve also contacts the sulci of the upper posterior teeth and the lingual surfaces of the incisors. Since this occlusal curve is common to the upper and lower teeth in centric relation, it should be the controlling factor in establishing the occlusal plane. Therefore, the normal plane of occlusion as viewed from the side is a chord of the common occlusal curve. This plane has an application to either the upper or the lower arch, and the normal upward inclination at the posterior end is about 3° to 5° relative to the horizontal plane.

Associated with the occlusal curvature are the three basic planes that are also essential factors in establishing occlusal relationships. For the measurement of elevation of the teeth, reference is made

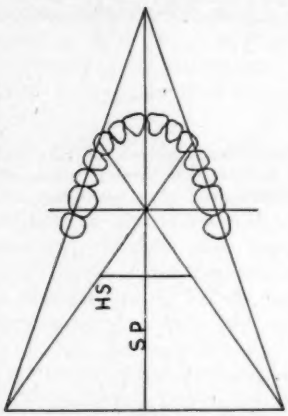

Fig. 5.—Ideal arch form with maxillary teeth correctly positioned as to pattern.

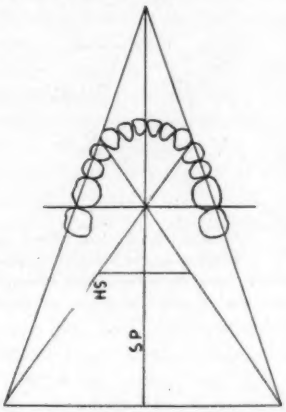

Fig. 6.—Ideal arch form with mandibular teeth correctly positioned as to pattern.

to the horizontal plane. For anterior posterior positions, they are related to the transverse vertical plane, and, for lateral positions, to the sagittal plane. In this way, each tooth unit or the entire dentition is visualized or measured relative to the three planes, and the occlusal curve and these planes and the sphere, in turn, are related to the skull as a whole. Unless these three planes and the sphere are established and so related, we are hopelessly lost, because we cannot tell which is up or down, level or otherwise. In this sagittal view, the transverse vertical plane, which is represented as a line from this aspect, passes through the center of the basic pattern and also through the distal third of the upper first molar and the distal margin of the lower first molar. Therefore, this plane in the normal patient locates the position of the first molar very close to the center of the masticatory machine, a point which is of importance in establishing tooth relationships relative to the denture bases.

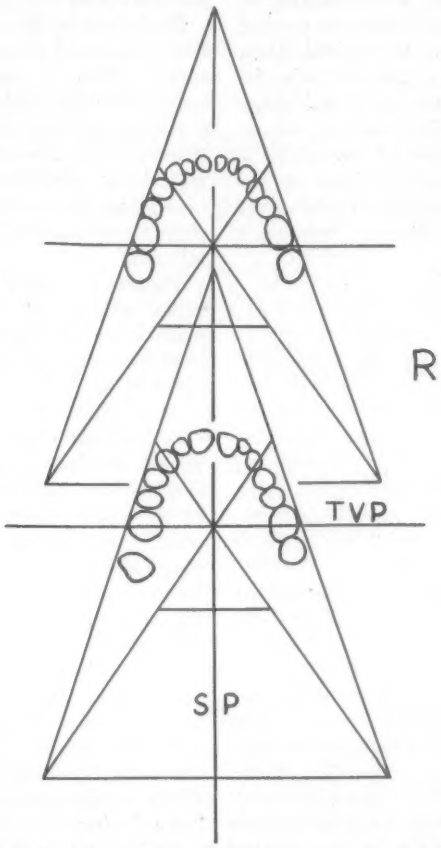

Fig. 7.—Deviations of tooth arrangement, as regards ideal arch pattern.

This tooth-to-denture-base relationship is shown in connection with the occlusal plane in Figures 2 and 3. When the teeth in the arch are arranged so that the transverse vertical plane passes back

of or in front of the first molar teeth, the plane of occlusion will tilt downward or upward as regards the horizontal plane. Either condition creates unfavorable forces on the denture bases, because of the tilt of the occlusal plane and the incorrect arrangement of the teeth which are off center as regards their bases.

Figure 4 represents a cross-section of the dental arch in the transverse vertical plane. From this view, the sagittal plane, SP, is represented as a line which divides the dental arch into two equal parts. Each pair of teeth, right and left, has an individual measurement of arch width in combination with their position on the occlusal curve. When the sagittal plane equally divides this distance between a pair of teeth, as shown in the figure, the occlusal plane, OC, will be parallel to the horizontal plane. This condition represents the ideal relationship for the occlusal plane as viewed from the front. In the lower drawing, the pair of teeth is not equally divided by the sagittal plane. Therefore, the occlusal plane is tilted and is not parallel to the horizontal plane. This condition is to be avoided. The controlling factor in this relationship is correct arch form.

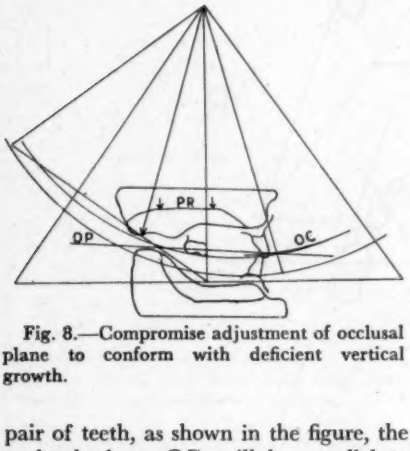

Fig. 8.—Compromise adjustment of occlusal plane to conform with deficient vertical growth.

Figures 5 and 6 represent an upper and lower ideal arch form with the teeth correctly positioned as regards the pattern. The relationship of the teeth to the sagittal plane can be seen to better advantage in this horizontal view, but the influence of an incorrect dental arch on the plane of occlusion was more clearly shown in the preceding figure. It should be understood that the arch pattern outline is a horizontal projection of the occlusal curve.

Deviations in the arch pattern will reflect changes of elevation in the occlusal curve. Thus, we see that the occlusal curve and the arch form control the positional relation of the occlusal plane. Hence, a clear understanding of these underlying principles will be of benefit in reading the effect or results of improper arrangement of teeth in the dental arch.

Figure 7 represents the upper and lower arch pattern of a patient having masticatory problems. From the arch patterns, some of the reasons for this difficulty are as follows:

1. In the lower drawing, the transverse vertical plane passes through the centers of the maxillary first molars instead of the distal third. Therefore, all of the upper teeth are positioned posteriorly as regards the center of the masticatory pattern. By this arrangement, the occlusal plane will be proportionately higher at the posterior end, as viewed from the side.

2. On the right side, in both arches, the teeth are farther away from the pattern line than those on the left side. Therefore, the plane of occlusion will be lower on the right side; an upward slant of the occlusal plane resulting, as viewed from the front.

3. The teeth of both arches do not follow the arch pattern line. Therefore, a normal occluding relationship cannot take place.

Figure 8 represents a case in which the basic pattern is large in proportion to the growth development of the denture bases, and therefore a compromise treatment must be used. The occlusal plane is

raised about one-quarter inch. In order to correctly position the dentures on their bases, and permit the placing of the first molar teeth in their correct positions as regards the transverse vertical plane, the first bicuspids are left out of the dentures.

The more harmonious the growth and development of the anatomic structures, the more nearly will the basic functional pattern agree with the subject. Thus, a norm is established, and a comparison will reveal the individual characteristics, some of which are problems beyond our control.

55 East Washington Street.

MANIPULATION OF AMALGAM TO PREVENT EXCESSIVE DISTORTION AND CORROSION

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THE demand for a complete amalgam technic, taking into consideration the work completed by the Research Commission of the American Dental Association and the Bureau of Standards, has been recognized in this paper. A uniform amalgam technic which incorporates the later developments in the study of contamination during and after trituration is hereby presented for the convenience of the busy dentist who has neither the time to read nor inclination to acquire the various papers pertaining to the subject.

The matrix technic has been clearly demonstrated in a former issue of THE JOURNAL.[1]

THE MORTAR AND PESTLE

Mortars and pestles are not made from a standard pattern. They may be large or small. Some have raised centers, while others are of the bowl type. A few are etched for roughness, while many are ground. Mortars are made from glass and steel.

It is difficult to achieve a uniform mix of amalgam with the raised center mortar. Unamalgamated alloy granules will invariably be retained on the eminence of the raised center. These granules, if incorporated into the mix of amalgam, will cause the resulting filling to corrode rapidly.[2]

The bowl mortar with a large pestle is very efficient. The alloy and mercury may be held together in the depths of such a mortar until amalgamation is complete. The pestle should be large so that most of the alloy and mercury will be incorporated beneath its surface, a homogeneous mix resulting.

The condition of the mortar and pestle is important. Those newly purchased may contain many small pits. The pits, during trituration, fill with amalgam, which, when set, possibly contaminates later mixes.

CARE OF MORTAR AND PESTLE

Because of the differences in mortars and pestles, as sold by the manufacturers, it is recommended that the dentist grind each set frequently until the pits are eliminated and the mortar and pestle made to approximately fit. This may be

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From the Division of Operative Dentistry, University of California College of Dentistry.

accomplished by grinding with carborundum grit FFF mixed with water. It may require several hours to condition a mortar and pestle, and it may be done at odd times during a week or more. The mortar and pestle, which have been conditioned together, must bear some identification mark so that the same set may be used as a unit. It is obvious that a pestle ground to fit one mortar will not fit another well.

PROPORTIONING OF THE ALLOY AND MERCURY

The manufacturer's directions for the alloy-mercury ratio are based on weight. Therefore, an alloy calling for a 5:8 ratio must be weighed in those proportions to assure the best mix for this product.

The two most popular styles of dispensers are: 1. The balance, which proportions the materials by weight. 2. The automatic release type, which proportions by volume.

The balance dispenser is equipped with notches situated at the center of the arm. Numerals are clearly etched over the notches to assist in the adjustments; i.e., if a 5:8 alloy-mercury ratio is desired, the balance is placed in notch No. 8; etc. Mercury is then dropped in the mercury receptable on one end and the alloy is slowly poured into the alloy receptacle at the other end. When the correct weight of alloy, which is in the relation of 5:8 to the mercury, is realized, the arm will balance.

The automatic release type depends on a predetermined size of the well, which, when filled with alloy and mercury, approximately dispenses the correct proportions. When the apparatus is carefully adjusted for a certain alloy, and if care is used to manipulate it correctly, the proportions may be made reasonably close.

Some manufacturers cut alloys to different sizes, and these are manufactured under their trade names, but labeled as Fine Cut, A Cut, B Cut, etc. As the coarser cut alloys occupy more space for a given weight than the finer cuts, the dispenser must be readjusted each time that a different particle size is used. Most of the dealers will adjust the devices to the proportions suitable for their own products.

Greater accuracy may be achieved in proportioning alloy and mercury by weighing on well-balanced scales and storing in No. 2 gelatin capsules for future use—clear capsules for the alloy, colored capsules for the mercury.

HINTS ABOUT TRITURATION

There are several ways to amalgamate alloy and mercury. The most popular among dentists is trituration with the mortar and pestle. The mortar and pestle combination is indispensable in the professions and trades where comminution of small batches of material is frequently necessary. The combination was required in the early days of dentistry when the dentist was forced to make his own alloy by filing Mexican half-dollars. The filings were so coarse that it was necessary to use a rough mortar and pestle at the chair to pulverize the alloy and to force amalgamation. The mortar and pestle has persisted in dentistry, but with modifications, and it is not essential with all of the present day alloys. It may be used, however, and, when utilized with care, will create an amalgam that is entirely satisfactory.

At this writing, the mechanical amalgamator equipped with a timing device, which completes amalgamation in ten seconds or less, may be considered the ideal. Even in using this machine the dangers of contamination are still present. The capsule and pestle should be thoroughly cleaned before and after each operation and great care should be exercised that no set amalgam remains to contaminate the next mix.

A simple and efficient method of cleansing the capsule is to remove the

pestle immediately after trituration is completed, returning the mix to the capsule itself and triturating again, with the pestle removed, for one second. The mix will then roll to the bracket table in a ball, and the amalgam which would otherwise adhere to the capsule is incorporated in the main mass.

Great care must be exercised to make certain that set amalgam is not retained in the capsule. Removing the hardened mass with sharp instruments scratches the metallic wall. The scratches may retain small amounts of amalgam to contaminate future mixes.

The speed of amalgamation with this machine permits the operator to make multiple mixes for large cavities. Five, ten or more minutes may be taken to complete the filling and a new mix can be made each three minutes. This is called the "installment plan" of mixing and packing. It assures, throughout the operation, amalgam which at no time exceeds the age of 3 minutes. An extensive restoration can be made in this manner, the entire filling being constructed of strong amalgam in the early stages of its crystal growth.

The rubber dam or thumb stall is another means of amalgamation. The alloy and mercury are placed in the rubber and rubbed to plasticity, as advocated by Marie Gayler.[3] The resulting amalgam is very well mixed in a shorter space of time than can be accomplished with the mortar and pestle. The rubber should be thoroughly washed and dried to prevent contamination of the amalgam.

All dentists know from experience that more mercury may be expressed from freshly mixed amalgam than from that which is 2, 3, or 4 minutes old. The freshly mixed material gives up its excess mercury readily because it has not had time to combine with the crystallizing mass. Therefore, fillings that are packed with fresh amalgam contain a lesser amount of excess mercury. Ward[4] showed that amalgam which rested on the bracket table for five or more minutes retained more mercury than that which was packed immediately.

CONTAMINATION OF AMALGAM

As a result of insufficient trituration, many of the alloy granules go through the mixing process partly coated with mercury. Therefore, it is advisable to shake the mortar frequently to assure complete incorporation of all the alloy particles during the early part of the operation. Trituration should be thorough. The presence of unamalgamated or partly amalgamated granules may cause corrosion in the finished restoration. Mulling in the rubber dam or thumb stall after the material has been through the action of the mortar is a safe practice provided it is not carried to extremes.

Set amalgam adhering to the sides of the mortar or retained in the pits found in a new one will contaminate the subsequent mixes. The mortars should be scrupulously clean at all times. The use of acids will remove the old amalgam, but such a procedure is temporary, for the pits will be filled again with the next mix. Therefore, it is advisable to grind the pits from the mortar as outlined in "care for mortar and pestle."

Moisture, which may enter the field during mixing or packing, will cause the formation of pockets of hydrogen in the finished restoration. The liberation of gas causes a delayed expansion usually starting about the fourth day and continuing indefinitely, according to the American Dental Association Research Commission and the National Bureau of Standards.[5] This phenomenon occurs in the alloys containing zinc. Apparently, the zinc influences the chemical reaction. Non-zinc alloys do not expand excessively on contact with moisture, as noted in laboratory tests.[6] Moisture should never enter the field at any time regardless of the type of alloy used, since the

moisture which is retained within the amalgam inhibits cohesion of the mass and induces porosity. A porous filling invites corrosion. An amalgam thoroughly condensed in a dry field, and uncontaminated, will retain its luster indefinitely provided the patient pays reasonable attention to mouth hygiene.

PREPARATION OF THE AMALGAM FOR PACKING

Most investigators have, in the past, advocated the retention of various amounts of excess mercury in the first piece of amalgam to be packed. Their reason for retaining this mercury was to gain plasticity for adaptation. Information gathered during the past several years shows me that adaptable plasticity can be acquired without the addition of mercury in excessive amounts.

The amalgam, which has been triturated and mulled in the clean rubber dam, is rolled into a rope (mulling is unnecessary in using the mechanical mixer or rubber thumb stall) and cut into five convenient pieces. The first piece is picked up with an amalgam carrier and placed in a linen cloth. The piece is then squeezed to eliminate as much excess mercury as will be expressed by finger pressure. Pliers should not be used for this operation as they remove too much mercury.

The amalgam, when relieved of considerable mercury, has a dry and crumbly appearance and is unfit for packing with hand instruments. (In using the Hollenback condenser with the amalgam condensers suggested here, it is not necessary nor desirable to rub the dry amalgam to plasticity. The successive mallet blows cause the dry amalgam to become plastic within the cavity during the packing operation.) It must be plasticized so that it will flow to the depths and angles of the cavity. The dry mass may be plasticized by rubbing it several times in the same squeeze cloth. It now has a glistening appearance and is ready to be passed to the cavity for condensation. The amalgam carrier is used to move the material from the bracket to the cavity, with great care that the fingers do not touch it at any time.

It will be noted that the dry amalgam which has been rubbed to plasticity retains some excess mercury, which should be removed, if possible, during condensation. The first piece of amalgam is pressed deep into the cavity and, with a condenser covering the greatest possible surface, heavy pressure is applied. The packing should be done with a steady thrust and a "wobbling" motion. The wobbling or shaking motion forces the amalgam into a compact mass and, at the same time, causes the weak plashy material to be forced toward the walls, where it is collected on the ledge of the condenser. The excess thus recovered is removed from the field of operation.

The second piece of amalgam is passed from the bracket and is prepared for condensation in the same manner as the first. During the packing of the filling, care must be exercised to remove the excess plashy material as it accumulates. When the occlusal margins are reached and slightly covered, it is unnecessary to overfill with plier-squeezed amalgam.

Stepping with small "pluggers" or burnishing the material within the cavity is strongly condemned. The stepping with small pluggers merely pushes the amalgam from one place to another and condensation is not realized. The small pluggers push holes in the mass, which has previously been laid down, and their use tends to result in a weak and porous filling. In burnishing, the soft material is pushed ahead of the burnisher, this weak amalgam depositing itself on the margins and in the sharp angles where the strongest alloy is desired. The cavity should be completely packed in the

shortest time consistent with thorough condensation.

TYPES OF CONDENSERS

According to G. V. Black, a condenser must occupy as much cavity space as possible and be as large as the cavity will permit.[7] The set of seven condensers are made to conform approximately to the contours of the various cavities so that this rule will prevail. The face of the condenser is smooth so that the excess plashy amalgam which accumulates beneath the instrument can be forced toward the cavity walls, where it is easily removed from the field.

Overfilling with extra dry amalgam is contraindicated. Experiments conducted at the Stockton State Hospital show that the plier-squeezed material does not unite well with the underlying amalgam. In time, the surface layer will invariably chip or flake away, leaving a rough and pitted surface, which invites corrosion.

Therefore, when the cavity is filled and the margins are covered, even though the surface appears to be soft, the extra dry amalgam is not to be added. In less than one minute, the apparently soft surface will harden sufficiently and carving may be undertaken at once.

Carving should be accomplished with sharp instruments and attempted only on those surfaces that may later be polished; i.e., the occlusal. The buccal and lingual parts of the proximal surfaces may be carved, but only in the areas to which polishing brushes have access. The proximal surface is never disturbed with a carver unless it is so situated that polishing brushes can be used later. The smoothness imparted by the matrix band is far superior to that achieved with sandpaper strips, etc. Many of us are tempted to check on the gingival margin with burnishers while the amalgam is soft. This practice should be discouraged; for if the gingival margin has been wedged thoroughly, there will be little or no overhang. Once the setting amalgam is carved in this location, it is impossible to recreate a smooth surface. A slight overlap of amalgam at the gingival margin may be removed with gold files when the patient returns a week later for the final polish. The filing of the week-old amalgam finishes it to a remarkable smoothness and results in a margin which will resist caries and invite healthy gingivae.

FINISHING THE RESTORATION A WEEK LATER

Once hidden with amalgam, the enamel margins are uncovered with difficulty at a later date. Spiral plane fissure burs, round bud burs or stones may be used to roughly finish the restoration on the occlusal surface. The supplemental grooves on the incline planes of the cusps should be carefully cleared of amalgam. Otherwise, a prolongation of the material will overlap into these sulci and eventually fracture.

Stiff bristle brushes charged with a coarse abrasive will rapidly remove the tool marks left by burs and stones. If a stiff bristle brush is not handy, one may be made at the chair by cutting down a wheel polishing brush to within 2 mm. of the hub. A porte polishing brush cut to a cone shape is ideal for finishing occlusal surfaces. The coarse abrasive paste can be made by the dentist from the materials at hand, as follows: laboratory pumice mixed in a plaster bowl with glycerin, to a stiff consistency, and toothpaste, added to impart flavor and whiteness. Denture powder is incorporated to hold the mass together. This paste should be well stoppered because of the hygroscopic qualities of the glycerin. The moisture from the air will cause the paste to become soft and sticky.

POLISHING CREATES HEAT

Water must be used continuously since the abrasive cuts many times faster when diluted. Also, heat radiates from

the filling. When the tool marks are eliminated, we may proceed to the final polish, to impart the deep platinum-like color which makes the amalgam outstanding for its beauty.

Tin oxide, zinc oxide or whiting in powder form makes the ideal final polishing material. It is diluted with water and should never be used in its dry state. Polishing creates heat; heat affects amalgam.[8] For the final polish, a soft polishing brush is used charged with the powder mixed with water, revolving the brush at high speed and keeping it moist at all times. For the final and lasting finish, a stream of water is played on the highly revolving brush. This will bring the polish to its completion.

The rubber cup creates intense heat in a remarkably short time. A stream of water will not cool it sufficiently. A rubber cup, if employed, is removed every few seconds to allow the filling to cool. To play safe, a rubber cup should not be used.

CONCLUSIONS

An amalgam restoration of rare beauty and stability can be made by following the foregoing outline. The careless mixing of alloy and mercury and the use of amalgam which has been contaminated with moisture or other elements result in failure. An ordinary degree of care in the handling of amalgam will, in most cases, convert a failure into a success.

The time required to make a very successful filling is no more than that necessary for one of poor quality.

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VINCENT'S INFECTION

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VINCENT and Plaut, who worked in collaboration, concluded that the fusiform bacillus and the spirochete, acting in symbiosis, were the direct causative agents of the disease that came to bear Vincent's name.

However, this explanation by Vincent and Plaut did not appear to be satisfactory, and doubt as to the correctness of this conclusion has prevailed ever since among clinicians, who have pointed out that analysis of the saliva from normal mouths of human beings reveals both the fusiform bacillus and the spirochete.

In more recent years, other notable investigators have taken up the search and have discovered that the existence of the fusospirochetal organisms in great numbers at the height of the infection may be considered as coincidental and as playing no essential or secondary rôle in its pathogenesis. It has been suggested that, in view of these findings, the disease be known as acute herpetic gingivostomatitis.

The disease is more likely to occur among people who are living in groups under abnormal and unsanitary conditions; for instance, in concentration camps or in congested areas of large cities. As the disease is highly infectious, it can easily be transmitted from mouth to mouth by the use of unsanitary eating and drinking utensils and food, by kissing or by any other means of salivary contact.

In children 5 or 6 years old, the disease is usually found in the first permanent molar region, occurring as a result of eruption of the tooth. The inflamed condition of the gum tissue may be conducive to contraction of the disease. In younger children, the disease is usually manifested on the anterior portion of the palate, as a result of sucking the thumb, which evidently carries bacteria.

Children who are suspected of having the disease should not be allowed to attend school, but should remain at home and receive treatment until the symptoms subside. The parents should be reminded of the infectiousness of the disease and, in order that the rest of the family may avoid contamination, hygienic measures should be instituted. For the time being, and until the symptoms subside, the child should use separate dishes, have his own toilet and avoid sleeping with any one.

Soldiers who fought in the armed forces of the First World War were considerably affected by the disease. Subjected to living under undue strain, as well as under abnormal and unsanitary conditions, many of them fell a prey to this disease. Because epidemics occurred while the men lived and fought side by side in the trenches, the disease became known as trench mouth. Arsphenamine, the remedy of choice, was extensively used.

To avoid widespread epidemics of this disease in the American Armed Forces today, every officer in the Army Dental Corps receives systematic instruction on the subject after being commissioned, and the active cooperation of the Army Medical Corps and other units is enlisted. In instructions to all officers, warrant officers and sergeants, the necessity for men with ulceration of the mouth and gums to see a dental officer at the earliest possible opportunity is

stressed. The attention of the principal administrative medical and dental officers of the various expeditionary forces has been specifically drawn to the importance of adequate measures for the control of this disease, and a monthly return of patients is required from every command at home and abroad.

The most characteristic symptom of this disease is the fetid odor. This is due to the necrosed tissue. The onset of the disease is sudden and there is a complaint of bleeding of the gums, which are tender to the touch. The lesion begins as a grayish white spot of necrosed tissue at the crest of the septal gingivae at the contact point. There is a temperature between 100 and 102° F. accompanied by salivation, swelling of the glands, mental depression, loss of appetite and general malaise. The leukocytes usually number below 10,000 as compared to a high count in pyogenic infection, such as tonsillitis.

Many clinicians do not advocate the making of smears for confirmation of the diagnosis of the disease, but depend entirely on the clinical picture. These clinicians, men of repute, undoubtedly have the best interests of the patient at heart in deciding that the clinical picture is sufficient evidence for a diagnosis; but there have been cases recorded that have been mistaken for other infectious periodontal diseases or syphilis.

In the case of Vincent's infection, the taking of smears is strongly recommended in order to differentiate among hemolytic infections, syphilitic lesions, various rare types of tonsillitis and diphtheria.

In diphtheria, as well as Vincent's infection, we must remember that we are dealing with a pseudomembrane, and to base the diagnosis strictly on the clinical picture would be to invite disaster. Instead of a Vincent's infection, as diagnosed merely from the clinical picture, a Loeffler bacillus may be lurking deep in the recesses of the throat, and because of failure to take a smear to confirm the diagnosis, antitoxin serum is not employed and life may be endangered.

It is evident that we cannot be too careful in making the diagnosis. Every means at our command should be employed to supplement the clinical picture. The virus which appears to be the causative factor of the disease cannot, as far as I know, be seen or demonstrated with the facilities accessible to us. If it is asserted that the virus can be demonstrated, the method suggested may be so involved as to forbid its use. For this reason, the taking of smears is justifiable, not merely for the purpose of finding the fusospirochetal organisms, but also to eliminate the possibility that more deadly organisms are present.

The prognosis of the disease is favorable and prompt recovery is made when early and proper treatment is used. The prognosis becomes more unfavorable when there is involvement of the throat, as in Vincent's angina, and the consequences are very serious in the faucial and tonsillar form of the disease if prompt and proper treatment is not applied.

All surgical procedure is to be deferred until the acute condition subsides, when the diseased teeth may be removed, the teeth scaled, the gums treated surgically and all cavities filled. All irritation, however, should be eliminated.

A thorough scaling should be deferred until later. Often, the worst cases show very large calculi, which must be removed from the teeth in order that the drug may reach the tissues. This should be done carefully without traumatism to the tissues. Thorough hygienic measures should be taken and persistence in the treatment is important. The bacteria are apt to become immune to any drug used continuously and different individuals react better to different drugs.

General treatment should consist of catharsis and careful attention to diet.

Fresh fruits and vegetables should be taken liberally, especially fruits containing vitamin C, such as oranges and grapefruit.

There is no specific known for Vincent's infection. General supportive and local hygienic measures will lead to recovery. At least twenty-five different remedies are recommended for the treatment of this disease, each exponent valuing his particular treatment above any other. Only a few treatments will be discussed.

Sodium perborate has heretofore been a favorite remedy in the treatment of Vincent's infection. However, it is gradually being discarded by the profession, as it has been reported that, because of its injudicious use or of a sensitization to sodium perborate, some persons are affected adversely by its irritating and escharotic action. The lesions described included chemical burns of the oral mucosa, a form of hairy tongue and edema of the lips.

Mead[1] believes that of all the oxygen-liberating compounds, hydrogen peroxide is the most useful, and he has reason to consider it specific in its action. It may be used full strength in its ordinary form on pledgets of cotton to clean the gums, as a spray or as a mouthwash. It also may be used in connection with other drugs as a mouthwash.

Potassium permanganate, another oxygen-liberating compound, is very valuable as a mouthwash. In a 1:1,000 solution, it is very convenient for use by the patient and may be used freely and continuously with good results.

The dyes seem also to be effective in the control of this disease. Mercurochrome may be used in from a 3 to a 5 per cent solution painted around the gums. Methylene blue may be used with a petroleum jelly and the dry power applied direct to the gums on a pledget of cotton. In this way, staining of the tissues may be avoided. Acriviolet in a 1 per cent solution is also effective and gentian violet is useful in some cases. A 10 per cent solution of neo-arsphenamine in glycerin has been used with some success. Twenty-five per cent argyrol (mild silver protein) is a valuable antiseptic and stimulating agent.

Among the caustics may be mentioned trichloracetic acid up to 100 per cent; phenol 5 per cent in glycerin, and chromic acid up to 100 per cent. These are bactericidal, but all destroy tissue, and extreme care must be exercised in their use. I believe that, in the treatment of Vincent's infection, the use of caustics can be dispensed with and replaced by other remedies not so destructive to the tissues, yet just as effective.

Of the alkalis, sodium bicarbonate may be used. A 1 per cent sodium ricinoleate has been suggested. Soap has been recommended as a valuable adjunct in the treatment of this disease, and it may be used in various forms.

Neo-arsphenamine and other arsenicals given intravenously have been effective in many cases, but Lewis[2] believes that less drastic medication is preferable. He finds that one injection of bismuth subsalicylate in oil is usually effective in acute tonsillitis and Vincent's infection. The injection is given intragluteally. Good results have been reported from intravenous injections of antimony and potassium tartrate and the intramuscular injection of fuadin, an antimony compound.

CONCLUSION

1. Vincent's infection is highly infectious and isolation of the case should be advocated in order to prevent an epidemic.

2. The clinical picture should not be considered conclusive, but should be confirmed by microscopic examination. A differential diagnosis should be made to exclude hemolytic angina, syphilitic lesions, various tonsillar affections and diphtheria.

3. Assertions that the herpetic virus

is the causative factor do not offer any simplified technic for their confirmation. Until such a technic is forthcoming, the usual method of taking a smear from the affected part of the oral cavity for the purpose of microscopic examination of the tissues to determine whether fusospirochetal organisms are present will remain the method of choice. When the fusospirochetal organisms are found, we at least have the assurance that we are not dealing with more deadly organisms.

4. General supportive and local hygienic measures will lead to recovery. The diet should include fresh fruits and vegetables, especially fruits containing vitamin C (ascorbic acid), such as oranges and grapefruit.

5. As there is no specific for the disease, selection of the remedy for local application is left to the dentist.

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360 Parkside Avenue.

ALVEOLAR RESORPTION DUE TO TONGUE HABIT

IRVING M. SHEPPARD, D.M.D., New York, N. Y.

History.—A man, aged 34, complained of receding gums about the lower front teeth.

Examination.—The sixteen x-ray films, study models, questionnaire, color photograph and clinical examination revealed extreme recession about the lingual borders of the lower anterior teeth almost to the apices, with some hypertrophy and inflammation. Some overloading of these teeth was present in protrusive excursions. Early loss of the lower first molars resulted in considerable migration and tilting of the remaining lower molars and bicuspids. The upper left first and second molars were missing, with migration and rotation of the third molar. On the back teeth, there were few contacting surfaces. Nine carious areas were noted.

Fig. 1.—Apparently normal labial gingival structures.

Fig. 2.—Absence of large part of gingival tissue and bone from lingual aspect of lower anterior teeth.

Tartar, with food impaction, was present. An excessive intake of fermentable carbohydrate was admitted. The questionnaire also revealed a tongue habit consisting of working the tip of this organ against the lingual surfaces of the lower anterior teeth when the patient was nervous.

X-ray examination revealed nearly normal bone everywhere in the mouth, except for a slight loss of density about the lower anterior teeth, where it was noted that the labial structures were normal.

Treatment.—Treatment consisted of: (1) removal of decay; (2) removal of tartar and polishing of the teeth; (3) elimination of food impaction; (4) restoration of posterior surfaces; (5) relief of strain on the anterior teeth in protrusive relation, and (6) construction of an acrylic splint to replace the missing lingual soft tissue.

To summarize: Apart from the removal of decay, the treatment consisted of the elimination of all conditions that had a tendency to irritate any teeth, particularly the lower anterior teeth. Increasing the chewing capacity of the posterior teeth lessened the strain on the front teeth, while relief of trauma in the protrusive position also helped. Removal of tartar and elimination of food impaction also played a part. The acrylic splint extended from the cingula of the six lower anterior teeth down to the region of the apices for a distance of 1.5 cm. and from the distal surface of the left cuspid. The acrylic material occupied only slightly more space than did the lost gingival tissues in the area. Made from a hydrocolloid impression, it retained itself in place without the aid of clasps and covered the exposed root surfaces and presented a smooth lingual surface.

Fig. 3.—Apparently normal alveolar crests with interdental alveolar structures showing increased radiolucence about central and lateral incisors.

Comment.—When the patient felt himself working his tongue against the anterior teeth, he would insert the appliance, the smoothness of which lessened or removed the subconscious desire to press his tongue against the tissues. In any event, the area has been protected against such vigorous muscular action, which had been followed by actual soreness and inflammation of the tongue. The remaining lingual gingivae have maintained a healthy appearance for more than a year.

5 East Fifty-Seventh Street.

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MARCH 1 *Editorial Department* 1944

THE FUTURE OF DENTAL EDUCATION

WE are pleased to present in the present issue a midyear report from the Council on Dental Education, which sets forth, among other things, the plan of procedure followed by the Council in evaluating the dental schools.

When the present Council was first established, it set forth, as its conception of its fundamental purpose, an intent "To correlate in accord with the evolution of scientific knowledge, clinical experience and social and economic conditions, the procedures of dental education with the problems involved in meeting oral health needs, and to interpret the relations of dental education to the dental profession and to the public." And, in the pursuit of this laudable objective, the first and most important step appeared to be a survey of the various dental schools. That arduous task has now been completed and the Council is busily engaged in studying and correlating the data gathered with a view to compiling an approved or classified list of dental schools.

However, the Council is acting wisely, we believe, in deferring the announcement of an approved or classified list of schools at this junc-

ture. All of the schools are now under contract with the Army and the Navy or with one or the other of these agencies, and several schools are in the process of reorganization. Any public announcement about the rank or standing of schools under the existing situation might lead to unfortunate repercussions.

The Council has not yet determined, we understand, whether it will establish one list of approved schools or will classify the schools that it finds worthy of approval on two or more levels. We apprehend that the second course will be found the more desirable since the range, as every one knows, from thoroughly acceptable schools to those which deserve support and encouragement, but not first rank, is very great. Throughout its inquiry, the Council has made quite clear its desire to aid those schools which may have certain marked deficiencies to improve their status. The consummation of this significant undertaking will, we believe, bring favorable nation-wide recognition to the Council as an accrediting agency and will reflect credit upon the American Dental Association for establishing and sustaining a service of this high character.

The usefulness of such an inquiry to the schools themselves and the importance of the establishment of a dependable list of approved schools cannot be overestimated. We are glad, however, to note in the midyear report to the Trustees that the Council conceives of its long-range functions as embracing far greater responsibilities. It is one thing to evaluate schools as they stand today; it is another thing to keep constantly at work at the improvement of dental education on a broad national scale. The Council is giving due attention to certain important immediate problems confronting it in the fields of dental education and practice.

All these more or less current activities are important; but we wish especially to call attention to the long-range functions of the Council quite beyond its useful work as an accrediting and standardizing body.

It is a great satisfaction to note that the Council contemplates the inauguration of a nation-wide aptitude testing plan for all entering students, as soon as the war is out of the way. As the annual Dental Students' Register issued by the Council indicates, very satisfactory progress is being made in the qualification of new students on the purely quantitative side. The last year of complete record revealed, for instance, that 27.1 per cent of the entire enrollment entered upon dental study with a bachelor's or other degree, and 23.8 per cent had three or more years, and 49.1 per cent two years or more, of liberal arts education. This is

a splendid showing, but, as the Council has frequently pointed out, the quality of the scholarship of the applicant beyond a reasonable minimum is of greater significance than the extent or length of his predental course.

We do not yet attract our share of students from the upper levels of scholarship. The Council has wisely, we believe, made a gesture in this direction by providing that students of exceptionally high standing, and possessing all the other qualifications, may be admitted to the study of dentistry without the customary credits in elementary biology or physics. We have always felt that there is something educationally unsound in insisting upon one crystallized procedure—and one only—for admission to the study of dentistry. Of course, biology and physics are desirable, and so are history and mathematics. No one has ever really demonstrated that the brilliant student lacking one or the other of these sciences, but possessing a well-balanced background based upon other subject matter, may not overcome all the hurdles which the dental school sets up for him. In any event, liberalization which puts a premium on scholarship surely points the way that we wish to go. The tests that the Council proposes to undertake will, we hope, throw more light on the aptitude, character and type of personality which we should insist upon in those preparing to enter the dental profession.

Another long-range problem which engages the constant concern of the Council is the successful bridging of the gap between the two phases of instruction in the dental schools. We refer, of course, to the so-called basic sciences and to the clinical instruction that normally follows their presentation. There is apparently no longer any debate upon the desirability of giving the dental student instruction in anatomy, physiology, bacteriology, pathology and allied subjects. There is, however, necessity for constant effort to justify in the minds of both the teachers and the students the teaching of these subjects. The dental implications of the preclinical sciences must be in the minds of the teachers; and the necessity for well-grounded training in these fields must have the sympathetic and cooperative understanding of both science and clinical teachers.

It appears generally that the school of medicine in most universities has the best facilities for teaching the preclinical sciences. The Council properly insists that the dental educational program is entitled in every instance to the best that the university has to offer. We are gratified at the firm stand the Council takes at all times upon the desirability of

autonomy in dentistry, not only in practice, but in the educational field as well. We understand that perfectly harmonious and effective relations now prevail in many institutions between medicine and dentistry in the teaching of the sciences, without any loss to the dignity or control of the dental educational program. The indispensable desideratum which we hope that the Council will keep constantly in mind is the more thorough integration of preclinical and clinical teaching. Progress, in our judgment, lies along this line.

The history of dental education is revealed through a long series of evolutionary processes. It often appears that time alone accomplishes the desired end. There is now a salutary evolutionary process going on which we believe the Council can promote. We refer to the gradual transformation of the clinical faculties from the apprenticeship era of earlier days to the level of university teachers in education, experience and fitness. It is well known that, even yet, the great majority of clinical teachers have a very limited background of general education and that by far the larger number of them have had no advanced training and are teaching in the schools from which they graduated. This is not to reflect upon their accomplishments: they have done a splendid job. It is perfectly clear, however, that demands of the future will call for clinical teachers with broader preliminary education, with scholastic ability proved in graduate studies and with wider contacts in training and experience.

This evolutionary process has been slow because opportunities for the advanced training of prospective clinical teachers have been few. The Council, we believe, can wisely give encouragement to qualified dental schools to enlarge their postgraduate and graduate offerings. We believe that, after the war, we shall see a great awakening among the younger men in dentistry and that they will resort to the schools for further training in much larger numbers than ever before. Out of this awakened interest will, we hope and believe, come a new generation of clinical teachers.

The advancement of dental education depends in large measure, as does all education, on the material support which society provides. Eighteen years ago, William J. Gies, in his monumental study of dental education, pointed out that the reforms which he then advocated depended on more generous support of the program of dental education by society as a whole. There has since been some progress, particularly in the state university dental schools, but nearly half the dental schools in the United

States receive very little aid from their parent institutions, being forced to rely almost wholly on receipts from tuition, fees and clinics. This situation must be corrected if we are to lift all dental education to the level of a genuine university discipline, which, we understand, is the goal toward which all the efforts of the Council on Dental Education are directed.

THE FIGHT AGAINST CRIPPLING

The last hundred years have seen many weapons forged for use in the fight against crippling, but it is a paradox that we seldom think of these weapons or their discoverers except in the presence of their failure. Surrounded by healthy and happy children, we have no

thought of those toilers in the laboratory to whom we possibly owe the strength and well-being of our own children, and we are reminded of the great "microbe hunters" only when we see some unfortunate child deformed by a preventable disease.

In overcoming this paradox, the Easter seal for crippled children fulfils a useful function. It not only turns our thoughts to the crippled children who are with us, but also reminds us of the debt of gratitude we owe many great men, living and dead, for having created the means of preventing the crippling of hundreds of those who pass us on the street every day.

The fight against crippling is part and parcel of the eternal quest for truth; and though it may be interrupted temporarily when cer-

tain social forces get out of hand, the desire for truth is the one solid line that we can hang on to when the gales of war blow loudest. We cannot abandon the fight against crippling simply because a few madmen have plunged the world into a bout with one of the greatest cripplers of them all. Perhaps some day a social pathologist, profiting by the scientists' example, will find a way to immunize the world against the virus of war.

The eleventh annual sale of Easter seals for crippled children, sponsored by the National Society for Crippled Children, Elyria, Ohio, and its affiliated organizations, will be conducted this year from March 9 to April 9.

The appearance of the Easter seal for crippled children is a happy reminder that there are certain constant human values and that there is a continuity of human desire to strive toward the light. We cannot all be heroes, of either the laboratory or the clinic, or of the battlefield, but most of us can afford to put Easter seals on our letters and, in this way, make a contribution to the welfare of the community and state.

Easter seals cost a penny each or $1 per sheet of 100. Your contribution will help make possible the work outlined above. The knowledge that you have helped bring crippled children the hope of growing up into useful and happy men and women will make your own Easter happier. Share your Easter joy by buying Easter Seals for crippled children.

INDEX FOR 1943

THE Index for Volume 30, 1943, will be published this year separately from THE JOURNAL and will be supplied without cost to all members of the Association upon request.

The Index is being published in this manner in an effort to aid the Government in the conservation of paper.

We urge all who wish copies of the Index to send in their requests promptly.

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WAR SERVICE COMMITTEE

WAR MANPOWER COMMISSION

PHYSICIANS, dentists, veterinarians, sanitary engineers and nurses who are salaried employes in essential or locally needed activities are hereafter subject to the same provisions of any employment stabilization program which applies to other workers in such activities, the War Manpower Commission announced today.

Such professional employes may not change their jobs without getting statements of availability from the United States Employment Service, or being referred to new jobs by the USES.

The USES, however, it was emphasized, will make referrals of such employes only after consulting the state chairman of the Procurement and Assignment Service.

This procedure, it was explained, will insure referral of these professional workers to jobs where they can make their most effective contributions to the war effort.

Upon approval of the Regional War Manpower Director, any state director may delegate the duty of referring such employees to new jobs to the state and local offices of the Procurement and Assignment Service.

COMMITTEE ON LEGISLATION

DENTAL LABORATORIES SUPPLYING DENTURES TO THE PUBLIC HELD TO BE PRACTICING DENTISTRY IN OKLAHOMA

IN a decision dated November 9, 1943, the Supreme Court of Oklahoma held that one who operates a dental laboratory for the purpose of supplying artificial substitutes for natural teeth for the public generally is to be regarded as practicing dentistry under the definition of that term as contained in the Oklahoma statutes.

The Oklahoma State Dental Act provides in part as follows:

Sec. 3.—The Registered Dentists of Oklahoma.

There is hereby constituted an Organization to be known as "The Registered Dentists of Oklahoma," hereinafter designated as "The Organization," which shall have a seal and may sue and be sued, and which may, for the purpose of carrying into effect and promoting the objects of said organization, enter into contracts and acquire, hold, encumber and dispose of such real and personal property as is necessary thereto. The members of the Organization shall be all persons now entitled to practice Dentistry or Dental Hygiene in this State.

The Registered Dentists of Oklahoma, hereinafter referred to as the plaintiff, brought an action against Norman V.

Curtis, who was doing business as the United Dental Laboratory, hereinafter referred to as the defendant, to enjoin the alleged wrongful practice of dentistry. The defendant denied being engaged in the practice of dentistry.

The portion of the law of the state of Oklahoma applicable to this case reads as follows:

> Any person shall be regarded as practicing dentistry within the meaning of this Act who shall hold himself out, or employ methods, in any way, representing himself as being engaged in the practice of dentistry . . . or supplies artificial substitutes for natural teeth. . . .

Trial was had to the court upon the following stipulation as to the facts:

> It is hereby stipulated and agreed by and between the parties hereto that the above cause shall be and is submitted to the court on the following stipulation of facts: "That the United Dental Laboratory, located at 402 South Cheyenne, Tulsa, Oklahoma, is owned and operated by the defendant, Norman V. Curtis, who is not a licensed dentist. That on several occasions persons have gone to the defendant's laboratory for the purpose of having dental plates made. That said persons went to the laboratory as a result of having seen an advertisement in the local papers, stating that dental plates were made and sold by the above defendant, and for other reasons; that upon inquiring of the defendant as to said plates they were told that he would be happy to make the plates for them but it would be necessary for them to see a licensed dentist for the purpose of having the impressions made, from which the plates were to be made, and the defendant further suggested that there was a very good dentist just down the hall, Dr. Moore, who is and was at all times mentioned in this stipulation a regularly licensed dentist under the laws of the State of Oklahoma. That said persons did contact Dr. Moore and that the impressions were made. Thereafter, the impressions were taken to the laboratory of the defendant and the plates were made therefrom. That a contract for the sale of plates was made by the defendant and the customer; that a separate contract was made by the dentist and the customer for the making of the impressions and that the customer separately paid the dentist and the laboratory for their respective services. That in most of these instances, the dentist was Dr. Moore but that Dr. Moore was not the only licensed dentist who took impressions from which the defendant made plates, but in each instance in which the defendant had made plates, he had in his possession prior to the time he made such plates, a notation as to the shape of the face, color of the teeth and other material data and impressions made by a regularly licensed dentist.
>
> It is further stipulated and agreed that practically all of the regularly licensed dentists practicing their profession in Tulsa County, State of Oklahoma, on the date of this stipulation and for many years prior thereto, took impressions exactly as Dr. Moore took the impressions in the instances referred to in this stipulation and sent the notations and impressions to Hettinger Brothers, or other dental laboratories, and that in said laboratories the plates were made from the impressions taken by the dentist exactly as in the instant case. That thereafter said laboratories returned the plates so made to the dentist who took the impressions and the dentist collected the money for the plates from his patient; that said patients do not come in contact with and do not pay said laboratories for the plates; that in all of these cases the dentist is paid by the patient and the dentist himself pays the laboratory for making the plates.
>
> That at all times involved in this case the Oklahoma Tax Commission has required defendant to pay a two per cent (2%) sales tax on all plates manufactured and sold by him; that defendant has a written contract for advertising his business which requires him to pay a minimum charge of three hundred dollars ($300.00) per month for one year, and that there are approximately one hundred (100) practicing, licensed dentists in Tulsa County, Oklahoma.

The trial court found, from the above-stipulated facts, that the defendant was engaged in the practice of dentistry as defined in the Oklahoma statute, and decreed a permanent injunction. The

defendant then appealed to the Supreme Court which held in part as follows:

We are of the opinion that it is apparent that it was the intention of the legislature to protect the public from any person who might undertake to engage in the practice of dentistry without license to do so, and that part of its purpose was to prevent any one other than licensed dentists supplying artificial substitutes for natural teeth to the persons who would use them. An examination of the stipulation of facts discloses that the defendant, who had no license to practice dentistry, was engaged in the business of supplying substitutes for natural teeth to the public at large through advertisements in the newspapers and the telephone directory which patently were designed to induce the public to believe that the defendant was authorized to engage in the practice of dentistry by supplying artificial substitutes for natural teeth. This constituted a direct violation of the provisions of the statute quoted, supra, against a person holding himself out, or employing methods in any way representing himself as being engaged in the practice of dentistry. That the states may enact legislation of this type for the protection of citizens is well settled. See Semler v. Oregon State Board of Dental Examiners, 294 U.S. 608.

The defendant further argued that if the statute is to be strictly construed, it will not come within the rule announced in Lasdon vs. Hallihan 377 Ill. 187, and will come within the rule announced in State ex rel. Kennedy v. Lepon, 219 Ind. 1.

On this point the court held as follows:

We are unable to agree with the contention of the defendant. The statute which we are called upon to construe, and which is quoted, supra, makes no distinction between dental laboratories which undertake to supply artificial substitutes to the public generally and those which perform the work for licensed dentists only as does the Illinois statute, Ill. Rev. Stat. 1939, c. 91, Sec. 60, which was involved in Lasdon v. Hallihan, supra; nor does it contain any proviso excluding dental laboratories from its operation as does the Indiana statute, Burns' Ann. St. Sec. 63-522, which was involved in State ex rel. Kennedy v. Lepon, supra. For these reasons the cases cited have only an incidental application to the problem which this appeal submits for solution.

Copies of the above-quoted case of Curtis v. Registered Dentists of Oklahoma, as well as the cited cases of Lasdon v. Hallihan, State ex rel. Kennedy v. Lepon and Semler v. Oregon State Board of Dental Examiners, will be mailed to any dentist interested, on request to the Committee on Legislation, American Dental Association, 222 East Superior St., Chicago 11, Ill.

GEORGE H. FOX, *Secretary*,
Committee on Legislation.

BUREAU OF PUBLIC RELATIONS

NEW MOTION PICTURE—THE STUDENT FLYER

THE Public Relations Committee and the Bureau of Public Relations, in cooperation with the Victory Corps Dental Committee of the Council on Dental Health, has just completed a new black and white 16-mm. sound motion picture film entitled "The Student Flyer," designed for high school students. The committees hope that it will arouse interest in the nation-wide High School Victory Corps Physical Fitness Dental Program.

Fig. 1.—Never before has the youth of America been called upon to take part in so gigantic a task as the global war in which we are engaged.

Fig. 2.—The High School Victory Corps Physical Fitness Program prepares students to serve their country, and themselves, more efficiently.

Jim Barnes, a high school student and flying enthusiast, proves inable to master his flying instructions. Finally, after a particularly bad landing, his instructor advises him that it is useless to continue training. Jim, of course, is heartbroken. In a talk with the instructor, he recalls his continued boyhood interest in aviation. The kindly instructor advises him to have a thorough physical examination to determine the possible source of his trouble. Jim visits his physician, who

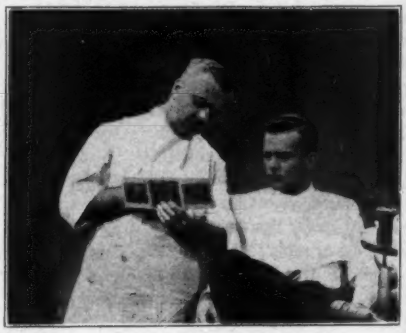


Fig. 3.—Dr. Forrest finds the source of Jim's trouble.

Fig. 4.—Happy landing.

discovers that his visual acuity is below par and advises a dental examination. Jim's subsequent visit to the dental office offers the dentist an opportunity to deliver a dental health message, which he does very skilfully. The final scenes show Jim after the dental infection has been removed and his sight restored to normal.

He completes his eight hours of solo flying, including spins and stalls, passes the civil aeronautic authorities' examination with flying colors and receives a pin from his instructor in remembrance of his first successful solo flight.

"The Student Flyer" has been examined and approved by a number of leading dentists, physicians, educators and high school students. It is full of action and human interest and is educational from both a dental and an aeronautic standpoint.

"The Student Flyer," presented by the American Dental Association, is made possible by a grant from the educational department of the Weco Products Co. It was produced by the Atlas Film Company of Oak Park, Ill. Complimentary copies of the film are being furnished by the Bureau of Public Relations to all state dental directors for use in connection with the State Victory Corps Dental Program.

"TO LIVE LONGER"*

THE Industrial Welfare Department of the Zurich Insurance Companies has developed a unique and practical safety zone health education program. Each month, it produces a sixteen-minute slide film talkie on a health subject, which it distributes to large manufacturers subscribing to the service. The films are shown employes by the Employes Health Committee during the lunch period or rest period or at some other suitable time. Safety Zone slide film talkies are without mention of insurance or the company name. One film lecture a year is on a dental subject. "Hold That Line" was presented in 1942 and "Toothfully Yours" in 1943 as is announced in the mid-monthly issue of THE JOURNAL.

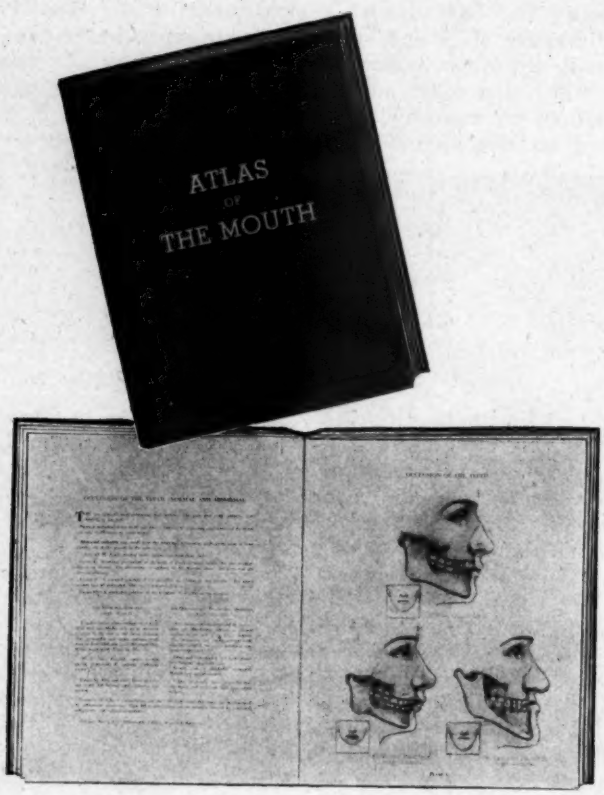
The February 1944 production is a departure from the usual theme as it is devoted entirely to public health activities, describing some of the activities of federal, state and municipal health departments and informing people as to how they can cooperate with medical and dental science and public health agencies in an endeavor to live longer and better lives. "To Live Longer," made with the assistance of the United States Public Health Service, is dedicated to that institution. Dental societies who may wish to present this film or the two films on dental subjects may make arrangements to do so by contacting the Industrial Welfare Department, Zurich Insurance Companies, 135 South La Salle St., Chicago, Ill.

*New slide film lecture presenting the story of American medical and public health facilities announced by Zurich Insurance Companies.

THE ATLAS OF THE MOUTH

FOR a reliable, up-to-date and ready reference, the new Atlas of the Mouth and Adjacent Parts in Health and Disease is one book that will be found indispensable. The text was prepared by Maury Massler, D.D.S., M.S., director of the Child Research Clinic, assistant professor of histology and lecturer in stomatology (University of Illinois, College of Medicine), and Isaac Schour, D.D.S., Ph. D., professor of histology and head of the Department of Histology, University of Illinois, College of Dentistry.

The growing interest of the health professions and the public in dental health prompted the authors to develop this new atlas of the mouth. Bound in durable imitation leather, its 104 pages contain 180 illustrations, nineteen in color, of anatomic structures and presenting physiologic conditions as well as certain pathologic conditions of the oral cavity. Its forty-nine 8½ by 11 inch plates were skilfully executed by Carl T.



Linden, under the supervision of Prof. Tom Jones, head of the Illustration Department of the Chicago colleges of the University of Illinois. Each plate is accompanied by a page of interpretative text and references. Never before has such an excellent compilation of dental illustrations been presented in one book.

Because of the scope of the Atlas, no attempt has been made to treat any one subject exhaustively. Sufficient attention is, however, given to the visual presentation of oral structures and relationships to provide the clinician with a sound background for diagnosis and treatment.

The Atlas of the Mouth is up to date and authoritative. It will make a valuable addition to the library of every practicing dentist and physician as well as every medical and dental student. The price is $2.50. It is distributed by the Bureau of Public Relations, American Dental Association, 222 East Superior St., Chicago 11, Ill.

INTERSTATE CONFERENCE ON CHILDREN'S DENTISTRY

ON Thursday, December 9, in conjunction with the Greater New York Dental meeting, the New York State Unit of the American Society of Dentistry for Children, called an Interstate Conference on Children's Dentistry, which was well attended by representatives from Massachusetts, New Jersey, Rhode Island, Pennsylvania, Connecticut and New York. Robert L. Heinze, president of the New York State Unit, presided.

Through the courtesy of the New York City Department of Health and Harry Strusser, chief of the Dental Bureau, the dental hygiene teachers employed in the New York City school dental program, presented a live puppet show depicting the essentials for good dental health: satisfactory and adequate diet to help build sound teeth, chewing exercises to help stimulate the investing tissues, good daily oral prophylaxis and periodic examination and care by the dentist.

After the introduction of guests from the various states represented at the conference and a discussion of the importance of children's dentistry in postwar planning, the six points listed below were incorporated in a resolution, which was unanimously adopted.

1. Complete cooperation with the A.D.A. Council on Dental Health in projects relating to the High School Victory Corps, public dental health legislation and dental health education for dental practitioners.

2. Establishment of a standard procedure to permit children to attend to their dental needs during school hours if necessary.

3. Establishment of a national and state dental health day.

4. Active representation in district societies, state and national organizations.

5. Active cooperation with all state and national health agencies and child welfare organizations.

6. Presentation of group clinicians (dentistry for children) at state and national dental conventions.

It was agreed that the Interstate Conference on Children's Dentistry should be made an annual function in conjunction with state dental society meetings and that representatives from the states included in United States Public Health Service District No. 1 be invited to participate in the conference. Arrangements are being made for another conference at the time of the annual meeting of the Dental Society of the State of New York, to be held during the week of May 8, in Buffalo.

COUNCIL ON DENTAL THERAPEUTICS

PRACTICAL SIGNIFICANCE OF ABRASIVES IN DENTIFRICES

SIDNEY EPSTEIN, D.D.S., San Francisco, Calif.

THE Council on Dental Therapeutics has authorized publication of this report. The opinions expressed are those of the author and do not necessarily reflect the opinion of the Council.

DONALD A. WALLACE, *Secretary.*

BASED upon human vanity coupled with the desire for good health, a tremendous industry has developed in this country for the purpose of providing cosmetics, drugs and appliances for self-medication and treatment of the many illnesses and discomforts both real and imaginary to which civilized man is heir. To further the end of the industry of vitamin and cosmetic panaceas, to promote or create the desire for its products, enormous sums of money are expended. Since this industry is a fixed part of our economy, it is desirable to evaluate the contributions that it makes to health.

Only one group of these products will be considered; namely, dentifrices: tooth pastes, tooth powders and liquid preparations. The Council on Dental Therapeutics and those doing investigative work in the field of dentifrices are agreed that dentifrices have only cosmetic value.[1] Certainly dentifrices have as yet no demonstrated therapeutic value. They are cosmetics in the sense that, as adjuncts to the toothbrush, they aid in enhancing the appearance of the teeth; help to cleanse the oral cavity of débris, and possibly give one a false sense of security by concealing unpleasant odors and tastes with others more pleasing. They are wholly without demonstrable medicinal, curative or prophylactic virtues.[2] By their very chemical nature, they can be nothing more effective than detergents. In the light of present knowledge, it is doubtful whether they should contain ingredients intended to prevent dental caries or correct pathologic conditions of the soft tissue. Routine and indiscriminate use of some dentifrices containing phenolic compounds or oxidizing agents may result in serious chronic irritation of the oral mucosa.

Divested of the flavoring agents, consisting usually of essential oils; saccharin as a sweetening agent; mucilaginous substances such as algin, methyl cellulose and the vegetable gums, and glycerin as a plasticizer, thickener or binder, a dentifrice has for its fundamental ingredients detergents and abrasive agents in the form of inorganic salts.

The purpose of the animal or vegetable soaps or sulfonated alcohols, so-called synthetic soaps, is to act as detergents by lowering surface tension and thus break up and remove mucous plaques, deposits and other débris more easily. The polishing or abrasive agent further aids in cleansing by its mechanical action. In previous studies,[3, 4, 5] it has been determined that the usual

From the Department of Physiological Sciences, College of Physicians and Surgeons, A School of Dentistry.

concentrations of animal or vegetable soaps, or some of the newer sulfonated alcohols, have no deleterious effects. However, there is the question of the possibility of the abrasives' causing a dangerous amount of destruction to the hard tissues of the teeth; namely, the enamel of the crown and cementum of the exposed root surfaces.

In a series of carefully controlled experimental studies extending over a period of four years, valuable data have been secured correlating the several individual abrasive agents commonly used in dentifrices and numerous commercial dentifrices with their abrasiveness as revealed by loss of tooth structure. The methods and results are described in a series of papers.[6, 7, 4] Apparatus and method were developed for determining the abrasiveness of dentifrice materials and proprietary dentifrices in contact with the enamel, dentin and cementum of human teeth under carefully standardized conditions. Results were always compared with those obtained with a paste of a standard U.S.P. calcium carbonate of known particle size mixed with 50 per cent water and glycerin.

It was found that the concentration of the dentifrice in the experimental procedures affected the degree of abrasion only slightly. Use of a toothbrush alone, wet with water and glycerin solution, caused only two-thirds of the abrasion caused by the use of control calcium carbonate. Tests made with the same apparatus and conditions, but substituting plates of copper, silver or antimony for teeth proved that these other testing materials were not suitable substitutes for teeth, since abrasiveness in contact with them did not agree with that in contact with tooth structures. There was no correlation between the abrasive values determined for the three different metals when compared with one another or with tooth structures. The effectiveness of an abrasive for a given structure can be accurately tested only upon, and expressed in terms of, the substance considered.[8] Simple scratch tests on glass microscope slides under standard conditions gave more favorable data.[9]

The size, hardness and shape of particles making up a dentifrice have a significant relationship to abrasion.[10] Abrasiveness is directly and linearly proportional to particle size and to hardness. Traces of contaminants would be increasingly important in a dentifrice as the hardness of the contaminating material increased; whereas, large amounts of smaller or softer material might be tolerated without increasing abrasiveness.

Under similar test conditions, dentin wore away 25 times as fast as the enamel cusps of lower molar teeth. Cementum was abraded about 25 times as fast as enamel.

Least abrasive proprietary pastes and powders were about half as abrasive as the control calcium carbonate, while the most abrasive were about twice as abrasive as the control. Of sixty commercial products tested, all were apparently satisfactory as to the degree of abrasion, especially since permissible degrees of abrasive power have not been adequately determined. Household brands of table salt and sodium bicarbonate possessed abrasive efficiency indistinguishable from that of specially formulated dentifrices.

When five liquid dentifrices were tested, less than one-half of the abrasion of the control was produced. Since this was significantly less than that caused by use of the brush alone, the diminished abrasion resulted from lubrication by the sufonated detergent and vegetable gums.

Of late, there has been considerable discussion of the merits of liquid dentifrices.[11] Before any consideration can be given to their true value, we must arrive at some understanding of the practical significance of abrasives in dentifrices. If attrition with an insoluble inorganic salt, in combination with the rubbing action of the toothbrush, is necessary to

cut away débris, we must reach some concept of the degree of abrasion that is desirable and necessary to achieve a desired result. Abrasive materials should not be harder than tooth structure; yet the hardness of the particle must be sufficient to assure cutting edges strong enough to engage and remove deposits that fail to yield to chemical detergents. A dentifrice devoid of polishing action may lack an important quality. Detergents, such as soaps and sulfonated alcohols, are not sufficiently vigorous to completely cleanse the teeth of certain stains and adherent débris. Some of these agents leave the teeth stained after repeated usage. Thus far, however, there is no acceptable evidence as to the ideal degree of abrasive and polishing actions for dentifrice preparations.

The widely advertised liquid dentifrices, i.e. flavored solutions of the alkyl sulfates with mucilaginous thickeners and glycerin bases, are almost entirely devoid of value as polishing agents. They contain no insoluble material to act as mechanical cleansers. Lowering surface tension is not sufficient to completely remove stain and deposits. As reported in a recent paper,[4] the use of a liquid dentifrice markedly lowers or decreases the effectiveness of the toothbrushing. The alkyl sulfate presumably serves as a lubricant for the bristles so that they glide or slip over the tooth surfaces without being able to engage débris and other accumulations. Liquid dentifrices, since they contain no polishing agents, produce even less abrasion to tooth structure than that caused by a wet brush alone.[4]

The manufacturers of certain liquid preparations urge the use of a polishing agent at least once a week. However, if a dentifrice is to be used at all, it might be advisable to use a mild polishing agent at more frequent intervals and dispense with the liquid dentifrice entirely, to promote cleanliness.

Ordinary household table salt (sodium chloride) or sodium bicarbonate may well be classified among the safest and most useful dentifrice materials. They are completely soluble salts that have moderate abrasive or polishing action while in their crystalline form. As they dissolve, the removal of adherent mucin deposits is facilitated.[1]

Abrasion of tooth structure which is caused by the combined action of an abrasive dentifrice and the injudicious use of a toothbrush may be a condition of long standing. It is not of recent origin or due to a sudden change in either dentifrice or habits. The typical saucer or wedge shaped lesion is almost always found gingivally from the height of convexity on the buccal or labial surfaces of the teeth, on the gingival third of the crown of the tooth or, if there has been gingival recession, at the cementoenamel junction. The lesion is found only in a mouth that shows diligent and prolonged effort at prophylaxis, especially when a hard textured bristle toothbrush has been used incorrectly.

Experimental data have demonstrated a slight tendency for pastes to be more abrasive than powders.[4] However, a comparison of twelve commercial products represented by both pastes and powders in the two series revealed that there was no consistent tendency for one of a pair put out by one manufacturer to be more abrasive than the other. In a few instances, there were rather striking differences, possibly because the manufacturers used different grades of abrasive materials in the two preparations.

The areas of abrasion seldom become carious, nor is the lesion usually a conspicuous one as far as esthetic values are concerned. The latter point is especially true today, since modern dentifrices are far less abrasive than those available ten or more years ago. In the past, dentifrice manufacturers used impure in-

organic salts of uncontrolled particle size and such abrasive materials as pumice, silica, cuttlefish bone and tin oxide. Use of such preparations over considerable periods caused destruction so marked that the abrasive lesion occasionally progressed through the dentin into the pulp chamber, but, despite claims, dental pulps were seldom devitalized even by that extreme injury. The process was a long slow one like the proverbial dropping of water on the stone. Over a long period of time, the pulp tissue was able to recede under the mild irritative stimulus and build a protective wall of secondary dentin.

Further, it has never been conclusively demonstrated that surfaces exposed to or removed by the attrition of a dentifrice are more susceptible to the ravages of dental caries. The fact that the surfaces are subjected frequently to the polishing action of the dentifrice should serve to keep them clean and smooth. If they decay as a result of cleaning of the teeth, it is logical to assume that the cleaner the surface of a tooth is kept, the more susceptible it is to carious disintegration. However, that point cannot be conceded. Apparent and unsightly cuts may be found on a few surfaces of certain teeth, but if that is the greatest damage that can be inflicted with an abrasive dentifrice and toothbrush, it is a small price to pay for clean, well-polished teeth.

In fairness, it must be stated that there is no excuse for the existence of any dentifrice which contains hard or large particles of any materials that are responsible for unnecessary scratching or wear of tooth structure, reducing the surface or etching it so as to favor the adherence of stains or plaques.

There is no doubt that the choice of dentifrice in terms of abrasive characteristics must be dependent on individual requirements. We must never lose sight of the fact that the action of the dentifrice is always enhanced by the vigor and method of using the toothbrush. However, exposure of the cemento-enamel junction is not so serious as some investigators would appear to believe. The tabulated results of a well-known, widely circulated report[12] show that abrasion occurs in excess of 0.5 mm. in only 4 per cent of an age group of 20-29 years; 14 per cent, 30-39 years, and a maximum of 30 per cent, 40-49 years. These figures become even less significant when it is realized that the destruction recorded did not involve all the teeth of the mouth or a sufficient number of surfaces or even a single area that jeopardized the pulpal vitality or caused the loss of any teeth.

SUMMARY

1. There is a definite relationship between particle size and hardness of insoluble constituents and the amount of abrasion caused by dentifrices. The larger or harder the particles, the deeper the abrasion.

2. Within reasonable limits, the concentration of the dentifrice will not affect the amount of abrasion.

3. No test material other than teeth is satisfactory for evaluating the amount of abrasion that can be caused by the use of a dentifrice on tooth structure. There is no correlation between tests on various metal plates and test teeth. A simple glass slide technic provides more readily acceptable data.

4. The amount of abrasion caused by the use of present day tooth pastes and tooth powders is not generalized throughout the dental arches or sufficiently serious to be a great hazard or cause irreparable damage to the teeth.

5. Liquid dentifrices containing alkyl sulfates, without some mild insoluble abrasive agent, do not possess a polishing action greater than that of a wet brush alone.

6. Ordinary finely ground table salt

or baking soda may still be regarded as choice dentifrice ingredients.

Correct application of the toothbrush, conscientious effort and sufficient time and concentration are adequate for ordinary home care of the mouth. These also constitute in essence the answer to the question: "Doctor, what shall I use on my toothbrush?"

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COUNCIL ON DENTAL EDUCATION

Chicago, February 1, 1944

To the Board of Trustees:

THIS midyear report to the Board of Trustees covers the activities of the Council on Dental Education from July 1, 1943 to February 1, 1944. Within that time, the Council has held two extended sessions devoted primarily to consideration of the data assembled in the visits of its committees to all the dental schools and to a study of the documentary information furnished by the schools upon forms issued prior thereto. The visits to the schools were concluded in June 1943. It has been an arduous task to formulate a basis of procedure and to organize the great mass of information so as to determine the relative standing of each school. To this end, the Council has organized its findings upon the framework of admissions, physical plant and equipment, faculties, organization and administration, libraries, financial management and support, clinical teaching, basic science teaching, research and hospital relationships.

In a three-day session held at the headquarters of the Association January 14-16, 1944, the Council fixed the preliminary basic weights to be employed in combining all the criteria in a final ranking of the schools. Various considerations have prompted the Council to defer for the time being the establishment of an approved or classified list of schools. All the schools are under contract with the Army or the Navy or both. Several schools are undergoing radical reorganization, touching, in some instances, basic corporate structure and, in others, curriculum, faculty and organization.

The Council takes the position that its long-range responsibility is to employ every means at its command to advance dental education on a country-wide basis to the level of a university discipline. As the study and investigation of the schools has procedeed, the Council has quietly counseled with individual schools as to means of improving their work and is happy to report to the Board of Trustees an awakened interest in all phases of dental education. Some of the evidences of this awakening, in which the Council feels that it has been privileged to participate, can be briefly summarized:

1. All schools are now faithfully observing the minimum two-year admission requirement prescribed by the Council for normal peace-time administration. About half of the schools have set up certain additional qualitative standards upon their own motion.

2. All schools are organized and conducted under the emergency on the accelerated basis so that the usual course covering four academic years may be completed within three calendar years.

3. All schools are offering in their curriculums all the courses or fields of instruction prescribed by the Council.

4. All schools have revised their curriculums to fall within the minimum and maximum limits of 3,800 to 4,400 clock hours for the professional course as prescribed by the Council.

5. Fourteen schools have made or are in the process of making marked improvements in the accommodations and collections of their libraries.

6. Eight schools are looking forward with confidence to the erection of new clinical buildings as soon as materials are available after the war. In some instances, plans are already drawn.

7. Two independent, detached schools have become integral parts of universities within the last two years and two others have hopeful negotiations under way to that end.

8. Contacts have been made in nearly

all the schools with the college and university presidents, deans of graduate schools, medical schools and liberal arts colleges and admissions officers. Gratifying evidence has been accumulated in this connection concerning the larger recognition which is being accorded the dental schools in the university circles of which they form an integral part.

9. Cooperation has been steadily maintained with other professional and regional accrediting bodies and with the American Council on Education. The Council is regularly invited to send delegates to conferences and meetings where similar agencies come together.

10. Close relations have been maintained with the American Association of Dental Schools and the National Association of Dental Examiners. The Council participates in the annual programs of these important bodies.

11. Effective working relationships have been established with the Army and the Navy and other federal agencies interested in the emergency program of dental education.

12. Before the present emergency arose, the Council conducted two congresses on dental education and licensure, which were productive in bringing about closer relationships between teaching and examining. It was the original plan of the Council to hold a congress of this character each year. Travel conditions during the war have made it necessary to postpone further effort in this direction. It is hoped that the movement can be resumed after the war.

The steady encouragement of progress of this character the Council conceives to be its continuing function. Pending the time when it may be deemed wise to announce publicly a list of approved dental schools, keeping in mind the constructive changes now going on in many schools as well as obligations to students enrolled in the emergency programs, the Council will go forward in acquainting each school in confidence with the findings concerning it. As rapidly as possible in the coming weeks, the Council will send a pattern map to each school indicating its relative standing in each of the broad fields of the inquiry. The accomplishments which are a cause for satisfaction in each school, as well as the evidences of weakness, will be frankly pointed out. In all this proceeding, the Council will keep in mind that its function is to build and improve rather than to destroy.

The Council is deeply concerned about the working out of the contracts of the schools with the Army and the Navy, especially if the war should continue for a considerable time. A canvass of the schools during the month of November 1943 showed a total enrollment in the thirty-nine dental schools of 8,871 students, of whom 6,310 were under the jurisdiction of the Army and 1,914 under the jurisdiction of the Navy and 647 were civilians. The Army and Navy predental programs are not yet in operation. It is anticipated that only enough students under these special requirements will be assigned to the study of dentistry to meet the annual replacement needs of these services. According to announcements, the Army and Navy together will assign to dental study only about 55 per cent of the total number heretofore admitted annually to the schools. With the growing shortage of manpower, it does not yet appear how it is going to be possible to recruit the remaining 45 per cent of new students each academic year in order to employ the full capacity of the schools. If civlian needs are to be adequately met in the years ahead, a full complement of students should be regularly admitted to dental study.

At the suggestion of the Council, the War Manpower Commission, through its Procurement and Assignment Service, some months ago appointed an advisory committee on dental education consist-

ing of J. Ben Robinson, dean of the Baltimore College of Dental Surgery of the University of Maryland, Chairman; Bert L. Hooper, dean of the College of Dentistry of the University of Nebraska; Wendell D. Postle, dean of the College of Dentistry of the Ohio State University; Carl O. Flagstad, secretary of the American Association of Dental Schools, and Harlan H. Horner, secretary of the Council on Dental Education. This committee has had a meeting with representatives of the War Manpower Commission in Washington and is endeavoring to find a way to meet this difficult issue.

Many new problems will engage the attention of the Council once peace comes. Already, it seems desirable to be looking forward to some of them. Shortly before Pearl Harbor, the Council received a preliminary report from a committee on specialties in dentistry, which had been instituted within its own membership, to study this important field in dental education and practice. The committee offered a definition of a specialist in dentistry, enumerated the specialties that it believed should be recognized and proposed that certification of specialists should be administered by the professional groups themselves rather than by state boards of examiners. The committee was preparing to continue its inquiries and to undertake to formulate proposed educational requirements for the certification of specialists. The war obliged the committee to suspend its efforts. The Council now feels that the committee should review its original findings and complete its report. The committee consists of Robert P. Thomas, chairman, Leroy M. S. Miner and M. Webster Prince. It is proposed to add to the committee two dentists from outside the Council who are familiar with the development of the specialties. As soon as they are chosen, the Board of Trustees will be asked to ratify their appointment in order that their traveling expenses may be met in attending meetings of the committee.

Another issue which it is time to consider has to do with postwar educational opportunities in dentistry and closely allied fields. The Council has appointed a committee on postwar educational opportunities in dentistry consisting of J. Ben Robinson, chairman, Robert P. Thomas and William N. Hodgkin. The Council was represented through the chairmen of the committee at a recent meeting in Washington called by the American Council on Education to consider the whole range of the educational needs of all those returning from service. At its meeting in Chicago January 14-16, 1944, the Council authorized the committee to proceed with its study of the postwar educational program with authority to act with respect to (a) probable needs for professional, subprofessional, postgraduate and graduate programs in dental education following the war; (b) the physical and personnel facilities available for this training, and any extension of current physical and personnel facilities which will be required to provide appropriate instruction to trainees on these various levels; and also instructed the committee to encourage the representatives of the Federal Government to provide financial aid in support of the postwar dental educational program.

At the meeting of the Council held in Cincinnati in October 1943, a committee on hospital dental internships was appointed, consisting of Leroy M. S. Miner, chairman, W. Harry Archer and Malcolm W. Carr. The appointment of the two members outside the membership of the Council was ratified by the Board of Trustees. In a meeting of the committee held in Washington, D. C., the President, Captain Wells, participated. The task of formulating standards for the approval of hospitals for the consideration of the committee has been committed to Dr. Archer.

At its January meeting, the Council elected William N. Hodgkin as chairman to succeed John T. O'Rourke, and J. Ben Robinson as vice chairman to succeed Roy O. Elam.

Respectfully submitted,

WILLIAM N. HODGKIN, *Chairman,*
J. BEN ROBINSON, *Vice Chairman,*
ROY O. ELAM,
LEROY M. S. MINER,
M. WEBSTER PRINCE,
JOHN T. O'ROURKE,
MINOR J. TERRY,
ROBERT P. THOMAS,
ARTHUR C. WHERRY,
—
HARLAN H. HORNER, *Secretary.*

SURVEY OF DENTAL SCHOOLS, 1942-1943

PLAN OF PROCEDURE

THE Council on Dental Education (successor to the Dental Educational Council of America) held its first meeting in May 1938 and issued its first pronouncement to the public in April 1939. This pronouncement dealt with the aims and purposes of the Council, set forth the range of its functions and responsibilities and outlined the principles and criteria which would be its guide in accrediting dental schools. In December 1940, the Council issued its Requirements for the Approval of a Dental School and announced that it would begin the visitation of schools seeking its approval in the fall of 1942. Application for approval was received from all the schools and visits were made by a committee of three representatives to all of the schools from October 1942 to June 1943. Thirty-eight schools are included in the list under consideration. The Harvard Dental School, being in the process of discontinuance, did not seek approval and the Harvard School of Dental Medicine was not far enough advanced for visitation. It is expected that the Harvard School will be considered later.

Subsequent to the announcement and publication of the Requirements, the Council issued a series of blank forms calling for information from each school as follows:

Form A. Aims and Objectives.
Form B. Organization and Administration.
Form C. Physical Plant
Form D. Financial Management and Support.
Form E. Admission.
Form F. Instruction and Research.
Form G. Clinical Dentistry.
Form H. Library.
Form I. Hospital Relationship.
Form J. Faculty.
Form K. Curriculum.

These forms were completed and returned by all the schools and have been collated and studied on a comparative basis. In arriving at the final comparative ranking of the schools, the Council has combined all the data derived from visits to the schools, and from the forms, A to K.

In the comparative appraisal of the thirty-eight schools, the criteria of the Council have been applied to items which fall in each of the following ten divisions: Admissions, Physical Plants and Equipment, Faculties, Organization, Libraries, Support, Clinical Teaching, Basic Science Teaching, Research and Hospital Relationships.

Because the various items in each of these divisions were assumed to vary in importance, they were each assigned a weighted value. In addition, each division was given a weight which represented its comparative value and that

which it held in relation to the whole. These weights which have been assigned to the divisions are known as basic weights.

ADMISSIONS

1. The percentage of the total enrollment entering upon dental study with three to four years of liberal arts education multiplied by a weight of 3.

2. The percentage of the total enrollment entering upon dental study with a bachelor's or other degree multiplied by a weight of 5.

3. The comparative percentage on a basis of 100 per cent resulting from appraisal of admission procedure, quantitative requirements, tests, etc., multiplied by a weight of 8.

The points derived under each of these units were added and then multiplied by a basic weight of 5, which was given to the whole division of "Admissions."

PHYSICAL PLANTS AND EQUIPMENT

1. The comparative percentage on a basis of 100 resulting from appraisal of "adequacy" multiplied by a weight of 10.

2. The comparative percentage on a basis of 100 resulting from appraisal of "condition" multiplied by a weight of 5.

The points derived under each of these units were added and then multiplied by a basic weight of 8, which was given to the whole division of "Physical Plants and Equipment."

FACULTIES

1. The ratio of teachers to students on a full-time equivalency basis. The actual service of full-time teachers and the equivalent full-time service of the part-time teachers on the basis of 1,000 hours as full time were combined and the schools were ranked on a percentage basis. The percentage was then multiplied by a weight of 10.

2. The percentage of the faculty holding a bachelor's degree multiplied by a weight of 2.

3. The percentage of the faculty holding a master's degree multiplied by a weight of 3.

4. The percentage of the faculty holding a doctor's degree multiplied by a weight of 3.

5. The percentage of the faculty holding a dental degree and one or more other degrees multiplied by a weight of 3.

6. The percentage of dental graduates of other dental schools multiplied by a weight of 2.

7. The percentage of full-time and half-time clinical teachers on a full-time equivalency basis multiplied by a weight of 5.

8. The percentage with outside teaching experience multiplied by a weight of 3.

9. The percentage publishing something in the last five years multiplied by a weight of 3.

10. The percentage participating in professional programs within the last five years multiplied by a weight of 2.

11. The grouping of the schools on a percentage basis from the standpoint of leadership multiplied by a weight of 3.

The points secured under each of these eleven items were added, and the total then multiplied by a basic weight of 10, which was assigned to the whole division of "Faculties."

ORGANIZATION

1. The comparative percentage on a basis of 100 resulting from an appraisal of "Aims and Objectives" multiplied by a weight of 5.

2. The comparative percentage on a basis of 100 resulting from an appraisal of "Organization and Administration" multiplied by a weight of 10.

The points derived under each of these items were added and then multiplied by a basic weight of 5, which was assigned to the whole division of "Organization."

LIBRARIES

1. The comparative percentage on a basis of 100 resulting from an appraisal of the library staff multiplied by a weight of 4.

2. The comparative percentage on a basis of 100 resulting from an appraisal of "Atmosphere and Effectiveness" multiplied by a weight of 2.

3. Physical accommodations as determined by the number of square feet of reading room space per student multiplied by a weight of 2.

4. The number of bound books and pamphlets multiplied by a weight of 4 and expressed in hundreds.

5. The number of periodicals as compared with the check list of 100 multiplied by a weight of 3.

6. The annual expenditure exclusive of salaries multiplied by a weight of 2 and expressed in hundreds.

7. Use as shown by average home loans per student for a year multiplied by a weight of 10.

The points derived under each of these units were added and multiplied by a basic weight of 7, which was assigned to the whole division of "Libraries."

FINANCIAL MANAGEMENT AND SUPPORT

1. Expenditure per student curriculum hour multiplied by a weight of 7. This factor was obtained by multiplying the total number of clock hours devoted to the curriculum by the number of students enrolled and by dividing the total expenditure by this figure.

2. The income from sources other than tuition, fees and clinics multiplied by a weight of 10. This factor was obtained by multiplying the total number of clock hours devoted to the curriculum by the number of students enrolled and by dividing the total income from sources other than tuition, fees and clinics by this figure.

The points derived from these two sources were combined and multiplied by a basic weight of 15, which was given to the whole division of "Financial Management and Support."

CLINICAL TEACHING

The score under each subject was determined by assigning points to the ratings as follows: A, 4; B, 3; C, 2; D, 1. The score thus derived was multiplied in each subject by weights as follows:

Diagnosis, 8.
Roentgenology, 2.
Orthodontics, 5.
Dentistry for children, 3.
Operative dentistry, 12.
Periodontia, 6.
Pulp canal therapy, 2.
Prosthodontia, 20.
Oral surgery, 5.
Anesthesia, 2.
Dental materials, 1.
Public health and hygiene, 5.
History, Ethics, Jurisprudence, Practice management } 2

The weights given to the clinical subjects were obtained by assigning to each subject a weighted value which represented the average percentage of the total curriculum hours now being given to these subjects and that which was previously recommended by the Curriculum Survey Committee of the American Association of Dental Schools. On the basis of the preliminary values secured from these two sources, certain modifications were made to bring the weights in harmony with the statements set down in the "Principles and Criteria," published by the Council in 1939 and "The Requirements for the Approval of a Dental School," published by the Council in 1940.

The points derived under each of these units were added together and multiplied by a basic weight of 20, which was given to the whole division of "Clinical Teaching."

BASIC SCIENCE SUBJECTS

The score under each subject was de-

termined by assigning points to the ratings as follows: A, 4; B, 3; C, 2; D, 1. The score thus derived was multiplied in each subject by weights as follows:

Anatomy and oral anatomy, 11.
Embryology, 2.
Physiology, 4.
Biochemistry, 3.
Bacteriology, 3.
Pharmacology and materia medica, 2.
Pathology, 5.
Medicine, 5.

The weights given to the basic science subjects were obtained by assigning to each subject a weighted value which represented the average percentage of the total curriculum hours now being given to these subjects and that which was previously recommended by the Curriculum Survey Committee of the American Association of Dental Schools. On the basis of the preliminary values secured from a consideration of these two sources, certain modifications were made to bring the weights in harmony with the statements set down in the "Principles and Criteria" published by the Council in 1939 and "The Requirements for the Approval of a Dental School" published by the Council in 1940.

The points derived under each of these units were added and then multiplied by a basic weight of 20, which was given to the whole division of "Basic Science Teaching."

RESEARCH

The comparative percentage on the basis of 100 resulting from an appraisal of research multiplied by a basic weight of 5 as a basis of final computation.

HOSPITAL RELATIONSHIPS

The comparative percentage on the basis of 100 resulting from an appraisal of hospital relationships multiplied by a basic weight of 5 as a basis of final computation.

FINAL SCORE AND RANK

The points credited to an institution under each division, when totaled, represented the institution's final score. This made possible the comparison of the thirty-eight dental schools in terms of these final scores. The final score of each school was obtained by adding the points credited to it under each of the divisions. The rank of each school in each division was determined by arbitrarily assigning 100 per cent to the school with the highest number of division points and by computing the rank or percentage of all the other schools on the basis of the school at the top of the list. Likewise, the final rank of each school was determined by arbitrarily assigning 100 per cent to the school with the highest number of total points and by computing the rank or percentage of all other schools on the basis of the school at the top of the list.

A pattern map will be sent to each school in confidence setting forth in graphic form the rank or standing accorded it in each division of the inquiry. The pattern map will be accompanied by a detailed statement of both the points of excellence and the weaknesses in each school as viewed by the Council, together with its suggestions as to possible means of improvement. For obvious reasons, the Council will not give to the public the relative standings of the schools either by divisions of the inquiry or as a whole. Announcement concerning the establishment of an approved list of dental schools resulting from the inquiry will be made at a later time.

HORACE WELLS CENTENARY CELEBRATION

EXACTLY one hundred years ago this year, December 11, 1844, there occurred in Hartford, Conn., an event which was of inestimable importance in its effect on the welfare of mankind. Horace Wells, a member of the dental profession, first demonstrated and announced to the world that nitrous oxide anesthesia could be employed to render the human body insensible to the pain of dental and surgical operations.

In the words of Walter R. Steiner, M.D.:

> To make a discovery, one must find out or invent something, then demonstrate it and proclaim it to the world; finally, he must convince the world of the validity of his discovery. . . . Wells discovered the principle of anesthesia, he demonstrated it satisfactorily here in Hartford and proclaimed it so that it was universally known in Connecticut and other portions of the United States.*

At the American Dental Association convention in Houston, Texas, in 1941, Henry Hicks, at that time president of the Connecticut State Dental Association and now Trustee from the first district of the American Dental Association, presented the following resolution, sponsored by the Connecticut State Dental Association, the Hartford Dental Society and the Horace Wells Club:

> WHEREAS, the discovery and recognition of the principles of anaesthesia occurred at Hartford, Connecticut, on December 11, 1844; and
>
> WHEREAS, this great gift to humanity was made possible by the vision, experiments and sacrifices of Dr. Horace Wells, a practicing dentist of that city; and
>
> WHEREAS, the centenary of that discovery is only three years away; therefore, be it
>
> RESOLVED, that the dental profession of the United States be requested to join in a centennial celebration to be held in Hartford, Connecticut, in the fall of 1944; and be it further
>
> RESOLVED, that the Connecticut State Dental Association, the Hartford Dental Society and the Horace Wells Club join in asking the American Dental Association to be the official head of the celebration, to appoint a committee to cooperate with the local committee, and to aid in its financing.

This resolution was submitted to the History Committee, with the result that the following resolution was read to the House of Delegates, October 7, 1941:

> WHEREAS, the Centennial of the discovery of anesthesia occurs in 1944; and
>
> WHEREAS, this is a matter of great importance in the history of our profession and that of medicine; be it
>
> RESOLVED, that this committee request that the American Dental Association take cognizance of this event and support measures for proper observance. In furtherance of this objective, the History Committee heartily approves the accompanying resolution from the Connecticut State Dental Association, the Hartford Dental Society and the Horace Wells Club.
>
> HISTORY COMMITTEE,
> B. W. WEINBERGER, N. Y.,
> *Chairman.*

This resolution was referred to the Reference Committee on Dental Education, which in turn brought in the following report:

> Since making our report of yesterday, a resolution presented on Monday by the History Committee has been referred to this committee.
>
> For the House to adopt the resolution referred to would, in effect, acquiesce to the requests of the:
>
> 1. Connecticut State Dental Association
> 2. The Hartford Dental Society
> 3. The Horace Wells Club
>
> To: (a) Become the official sponsor.
>
> (b) Collaborate with the named organizations.

*STEINER, W. R.: Horace Wells and His Discovery of Anaesthesia. *J. Connecticut M. Soc.*, 2:525, November 1938.

(c) Appoint a committee.

(d) Aid in financing a centennial celebration to be held at Hartford in the fall of 1944 in commemoration of the well known work of Horace Wells, dentist.

The Reference Committee believes that American Dentistry should and will do this. We recommend that the resolution be adopted, but that action relating to "aid in its financing" be referred to the Board of Trustees.

HARDY F. POOL,
LEO W. KREMER,
ERNEST G. SLOMAN, *Chairman.*

The report was accepted by a unanimous vote of the House of Delegates.

In January 1942, Oren A. Oliver, then President of the American Dental Association, appointed a committee known as the Horace Wells Centenary Committee. The original members of this committee were:

Eugene M. Clifford, Chairman, Hartford, Conn.

Frederic T. Murlless, Jr., Secretary-Treasurer, Hartford, Conn.

L. Pierce Anthony, Chicago, Ill.

W. Harry Archer, Pittsburgh, Pa.

Don J. Aubertine, San Francisco, Calif.

B. Lucien Brun, Baltimore, Md.

John W. Cooke, Boston, Mass.

Paul H. Jeserich, Ann Arbor, Mich.

Walter T. McFall, Asheville, N. C.

W. E. Mendel, Pittsburgh, Pa.

Robert L. Sprau, Louisville, Ky.

T. I. Way, Cincinnati, Ohio

W. J. Gies, New York, N. Y.

Arthur H. Merritt, New York, N. Y.

Howard R. Raper, Albuquerque, N. M.

Oren A. Oliver, Nashville, Tenn.

W. N. Hodgkin, Warrenton, Va.

This committee held meetings in St. Louis in 1942 and in Cincinnati in 1943, and will meet in Chicago in February 1944. At its organization meeting, Frederic T. Murlless, Jr., of Hartford was elected secretary and treasurer.

At the St. Louis meeting, Robert L. Sprau was chosen to organize a Horace Wells centenary committee in each of the various states. Owing to his able and conscientious work, such committees have been organized throughout the country. A list of the chairmen of these committees, and in most cases the entire committee, is given below.

In October 1943, at Cincinnati, the Trustees of the American Dental Association generously granted a sum of money to properly commemorate the centennial of Wells' great discovery.

Dr. Irwin Buell, of Trinity College, Hartford, has been retained to work with the American Dental Association committee to develop a publicity program throughout the country leading up to the final celebration, December 11, 1944.

The Horace Wells Centenary Committee hopes that each of the separate state committees will work out its own program and also send suggestions through its chairman to the Centenary committee. The Centenary committee will act as a clearing house for ideas, data, publicity material, special plans, etc., and as a coordinating agency for the state committees. The Centenary committee will also take the initiative in attempts to secure national publicity for commemoration of the discovery of anesthesia by a Hartford dentist. Suggestions as to the best way to attain this goal will all be welcome. Cooperation in doing so will be a *sine qua non.*

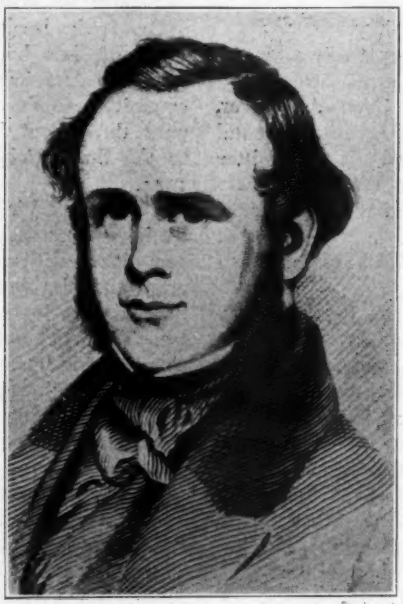
State chairmen should feel free to call upon the Centenary committee for assistance in any way, but should also feel responsible for their own programs. Printed material is available for use at annual meetings of state associations. Plans should be made to have such meetings center around discussions of Wells' unique contribution. Each state meeting might well be designated as the Horace Wells meeting.

The dental colleges should also feel the desirability of organizing separate committees for the part each can play in

the Centenary program, and should feel that they are also part of a great national committee for making the commemoration a successful one. The Centenary committee has selected cooperation as the keynote of the Centenary program.

A short history of Horace Wells is published herewith. In this article, there has been an attempt to avoid controversial material. The attempt will be made to commemorate Wells, the dentist, and his great contribution, and not to belittle the fine work of others.

THE STORY OF HORACE WELLS



Horace Wells

Horace Wells was born January 21, 1815, in Hartford, Vt., although his ancestors were among the earliest settlers of Windsor, Conn. His grandparents were Capt. Hezekia Wells and Sara Trumbull. Captain Wells, a man of great influence, served in the American Revolution. He died March 8, 1817.

Horace Wells, Dr. Wells' father, married Miss Betsy Heath, of Warehouse Point, Conn., and soon moved to Hartford, Windsor County, Vermont. Horace was the oldest of three children. Soon after his birth, his father purchased a large and valuable farm in Westminster, Vt., just below Bellows Falls, on the Connecticut River. His parents, who were intelligent and wealthy, gave their children every educational advantage. Horace had a good education: he at-

tended a select school until he was 13, then went to Hopkinton, N. H., where he spent a year in a private school for boys. Afterward, he went to Amherst and Walpole in New Hampshire.

In 1834, at the age of 19, he went to Boston to study dentistry. The Boston College of Dentistry was not then established, but young Wells acquired the best professional education possible at that time. After completing his studies, he opened an office in that city. The young dentist was a man of medium height, heavy set and unusually handsome, with high color, curly hair and a pleasant bearing. He was also exceedingly sensitive and shy. As a child, he had shown an inventive turn of mind and, as he advanced in his chosen profession, his ingenuity led him to invent and construct most of his own dental instruments.

When, in 1836, he moved to Hartford and opened an office, Horace Wells speedily took rank among the best dentists of the city, having among his patients the daughters of Governor Ellsworth. In 1838, he published a booklet entitled "An Essay on Teeth; Comprising a Brief Description of Their Formation, Diseases and Proper Treatment.

July 9, 1838, he married Elizabeth Wales. They had one son, Charles Thomas Wells.

In addition to his successful Hartford practice, Horace Wells had several students, including William T. G. Morton, of Farmington, Conn. and John M. Riggs. In 1841, Wells and Morton opened a joint office in Boston; but, in 1843, the partnership was dissolved, and Wells returned to Hartford.

According to several records, Wells had long been concerned about the pain suffered needlessly, at least so it seemed to him, by patients during the course of surgical operations. He sought a drug that could be used in some way to deaden this pain, but it was not until the evening of December 10, 1844, during an entertainment given by an itinerant lecturer, Gardner Colton, that Wells saw at first hand the pain-killing effects of the inhalation of nitrous oxide.

One member of the audience, Sam Coley, was injured severely while under the influence of the gas, and without pain to himself until the effect of the inhalation had largely disappeared. The next day, December 11, 1844, Wells inhaled an unusually large amount of the gas and had one of his own teeth extracted by Dr. John M. Riggs without pain to himself. A new discovery of great importance to mankind had been made.

Wells did not claim to be the first to discover the anesthetic properties of nitrous oxide, but he did claim that he was the first to demonstrate and proclaim that nitrous oxide could be used to produce complete anesthesia for a long enough time to permit painless surgical operations. After several painless extractions had been made in Hartford by him and his associates, Wells went to Boston, in 1845, to tell his old friend and former colleague, Morton, and others of his discovery.

While he was there, one attempted demonstration before a medical class at Harvard was not so successful as his former experiments in Hartford. This aroused opposition among the students of Harvard and hurt the feelings of the rather shy, moody dentist. He came back to Hartford rather crestfallen and unfortunately quite discouraged.

But he had made one of the greatest discoveries of all time. He did not carry on and reap the rewards that he should have had from it; but he lighted the torch and passed it on to others. He was the real discoverer, the man who saw, demonstrated and proclaimed. Often the real discoverer is partially overshadowed by those who, having received the spark of the discoverer's genius, go on to greater achievements. So it was with Wells. But the light was his. There were to be later developments; there

always are; but honor to the man who first applied a discovery in such a way that it became of inestimable value to mankind.

STATE CHAIRMEN OF THE HORACE WELLS CENTENARY COMMITTEE

Alabama: Chairman: Charles W. Lokey, Empire Bldg., Birmingham.

Arizona: Chairman: John Vincent Cogan, 548 E. Speedway, Tucson.

Arkansas: Chairman: J. L. Weatherall, Mutual Life Bldg., Pine Bluff.

California: Chairman: Don J. Aubertine, 870 Market St., San Francisco.

Southern California: Chairman: Arthur W. Lufkin, 6253 Hollywood Blvd., Los Angeles.

Colorado: Chairman: Clark W. Russell, 866 Metropolitan Bldg., Denver.

Connecticut: Chairman: Eugene M. Clifford, 57 Pratt St., Hartford.

Delaware: Chairman: Clyde A. Nelson, L. D. Caulk Co., Milford.

District of Columbia: Chairman: Walter A. Rath, 1835 Eye St., Washington.

Florida: Chairman: E. P. Lichtenberger, Titusville.

Georgia: Chairman: Irwin T. Hyatt, 56 Fifth St., N.E., Atlanta.

Idaho: Chairman: William M. Kibler, Pocatello.

Illinois: Chairman: John J. Donelan, 322 United Mine Worker's Bldg., Springfield.

Indiana: Chairman: Robert R. Gillis, 134 Rimbach St., Hammond.

Iowa: Chairman: L. M. FitzGerald, 718 Roshek Bldg., Dubuque.

Kansas: Chairman: Clark W. Mertz, Topeka.

Kentucky, Chairman: Philip R. Blackerby, Jr., Brook and Broadway, Louisville.

Louisiana: Chairman: Walter Leabo, Medical Arts Bldg., Shreveport.

Maine: Chairman: Harvard B. Colwell, 37A Main St., Lincoln.

Maryland: Chairman: B. Lucien Brun, 827 Park Ave., Baltimore.

Massachusetts: Chairman: Matthew C. Holmes, 1570 Main St., Springfield.

Michigan: Chairman: C. H. Jamieson, 8545 Gratiot Ave., Detroit.

Minnesota: Chairman: E. A. Rieke, 527 Lowry Medical Arts Bldg., St. Paul.

Mississippi: Chairman: J. A. Evans, Bay St. Louis.

Missouri: Chairman: F. M. Calmes, 1108 East 10th St., Kansas City.

Montana: Chairman: James A. Herrog, Metals Bank Bldg., Butte.

Nebraska: Chairman: L. E. Myers, Medical Arts Bldg., Omaha.

Nevada: Chairman: H. E. Cafferata, 424 First National Bank Bldg., Reno.

New Hampshire: Chairman: H. Shirley Dwyer, Concord.

New Jersey: Chairman: Walter E. Grevatt, 222 Ridgewood Ave., Glen Ridge.

New Mexico: Chairman: Louie Wampler, First National Bank Bldg., Albuquerque.

New York: Chairman: Emmanuel E. Blumenthal, 26 Court St., Brooklyn.

North Carolina: Chairman: Wilbert Jackson, Clinton.

North Dakota: L. I. Gilbert, 401 Black Bldg., Fargo.

Ohio: Chairman: O. B. Kneisly, 1102 American Bldg., Dayton.

Oklahoma: Chairman: Harry H. Sorrels, Medical Arts Bldg., Oklahoma City.

Oregon: M. Monte Bettman, 528 Medical Arts Bldg., Portland 5.

Pennsylvania: Chairman: W. Harry Archer, Professional Bldg., Pittsburgh.

Puerto Rico: Chairman: Jose Vicente, Box 1448, San Juan.

South Carolina: Chairman: M. L. Brockington, Florence.

South Dakota: Chairman: John Donohoe, Sioux Falls.

Tennessee: Chairman: Arthur R. Sample, Medical Arts Bldg., Memphis.

Texas: Chairman: C. S. Greusel, 927 Medical Arts Bldg., Houston.

Utah: Chairman: S. Kenneth Robbins, Medical Arts Bldg., Salt Lake City.

Vermont: Chairman: Charles I. Taggart, 139 Bank Street, Burlington.

Virginia: Chairman: Carter Crafford, 715 Medical Arts Bldg., Norfolk.

Washington: Chairman: T. M. Barlow, 510 Bellingham Nat'l Bank Bldg., Bellingham.

West Virginia: Chairman: F. M. Farnsworth, Buckhannon.

Wisconsin: Chairman: George D. Siewert, 2018 East North Ave., Milwaukee.

Wyoming: Chairman: Louis E. Hay, Cheyenne.

CORRESPONDENCE

"DENTAL PRACTICE AND DENTAL EDUCATION IN THE FUTURE; WITH CONSIDERATION OF SOCIAL AND HEALTH ASPECTS."

To the Editor:

I have read with much interest the letter by Dr. Wells in the February issue of THE JOURNAL commenting on my article "Dental Practice and Dental Education in the Future," which appeared in the January issue of THE JOURNAL.

I respect Dr. Wells' opinion and attitude very highly and recognize the fact that he expresses the reaction of a very large number of members of the Association. I appreciate, too, that at first glance my proposals seem to be in the direction of lowering of standards of our profession. Actually, of course, my aim is to raise those standards and to bring dentistry to a still higher place in the esteem of the public. This I hope to do by having the dentist broaden the scope of his activities along biologic lines. I do not see how this can be accomplished without his relinquishing something in other directions. The logical omission there would seem to be in the field of full and partial denture construction.

Dr. Wells expresses surprise that I as director of a large clinic for giving dental service to children should be the one to advocate turning certain phases of dentistry for children over to dental hygienists having a course of training shorter than that required for the D.D.S. degree. Actually my experience in this clinic leads me to feel that in the field of routine caries, including proximo-clusal cavities as well as pits, young women can be trained to perform these operations satisfactorily. Such procedures make up 90 per cent of the actual operative work for children. My proposal does not envision giving these young women responsibility for diagnosis or for the carrying on of more complicated procedures, including extractions. Under all circumstances they would be working under the supervision of a dentist who would attend to those matters beyond the scope of dental hygienists trained as I propose. The supervising dentist would be the one who would have the more complete basic training in science related to prevention as well as treatment of disease in children's mouths.

Similarly in the case of the dental technician, the supervision of the construction of dentures would be in the hands of the fully trained dentist. I believe today, with the development and systematization of the knowledge in the full denture field which is the product of our best prosthodontists, that it is possible for the dental technician properly trained to take good impressions and bite registrations and turn out dentures which will give satisfaction in a great majority of cases. As I said, the dentist who wishes to perform those steps or any others in that field for his patients can do so, but I believe economy really demands that this service be provided as I have suggested. Dentistry has a moral obligation to the public to provide its services in the most economical way consistent with high quality, as Dr. Wells will agree. I believe that we can by the method which I propose accomplish these desirable economies and yet give good service.

Regarding the attitude of medical men toward dentists, I know that very many individual physicians respect dentists as consultants on specific cases and that in general they recognize the important part dental disease may play in the causation or development of systemic disease. On the other hand, there are very many physicians who do not hold this viewpoint regarding dental disease and who look upon dentistry as occupying definitely a lower level than medicine in the health picture. Furthermore, evidence indicates clearly that medicine as a group is not cognizant of the part that dentists and dental service can and should play in the field of public health. This has been brought to the attention of dentists in New York City by one of our lay leaders in the field of welfare and health, a man who is fully conversant with the accomplishments and status of dentistry as it is today. Therefore, despite Dr. Wells' (and my own) favorable experiences with medical confrères, I still maintain the position stated in my article.

Dr. Wells states that "dentistry does not want so-called socialization or regimentation of the profession in any form." What the

profession wants and what it will get may be quite different. I do not think it wise to insist on there being no change in the *status quo* when all signs point to the inevitability of such change.

I think that we can accomplish the greatest good for the public if we lead the way in effectuating economies in the methods of providing health dentistry and thereby gain consideration for our views as to the undesirable features of programs that may be proposed by well meaning laymen or politically minded legislators.

JOHN OPPIE MCCALL.

DEATHS

ALBRIGHT, GEORGE B., Spencer, N. C.; University College of Medicine, Dental Department, Richmond, 1911; died December 22; aged 54.

ALKIRE, E. B., Weston, W. Va.; Baltimore College of Dental Surgery, 1899; died December 14; aged 70.

ANDREWS, GEORGE S., Tallahassee, Fla.; died January 1; aged 82.

ANDRUSS, RAYMOND M., Vancouver, Wash.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1902; died December 12; aged 61.

BACHELDER, WALLACE N., Millbrae, Calif.; died December 9; aged 38.

BALL, FRANK S., Milwaukee, Wis.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1902; died December 13; aged 77.

BALLARD, WILSON W., Louisville, Ky.; Ohio Medical University, College of Dentistry, 1904; died December 22; aged 66.

BLAZER, E. L., West Mansfield, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1898; died January 21; aged 75.

BOLLENS, WILLIAM L., New York, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; died January 19; aged 66.

BRADY, CHARLES R., Honesdale, Pa.; Pennsylvania College of Dental Surgery, 1880; died December 26; aged 91.

BRIGHT, R. M., Walker, Minn.; Vanderbilt University, School of Dentistry, 1907; died December 20; aged 60.

BRISKMAN, NATHAN, Atlantic City, N. J.; Pennsylvania College of Dental Surgery, 1902; died January 2; aged 62.

BROWN, LESLIE T., Cobleskill, N. Y.; died January 3; aged 83.

CAPRON, JEROME C., Vermilion, Ohio; Philadelphia Dental College; died January 12; aged 67.

CARMICHAEL, B. F., Schenectady, N. Y.; died January 19; aged 80.

CHAMPAGNE, ALPHONSE, Jersey City, N. J.; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1908; died December 23; aged 61.

CHAPMAN, W. A., Indianapolis, Ind.; died December 28; aged 84.

CHILTON, JESSE, Fullerton, Calif.; College of Dentistry, University of California, 1901; died January 13; aged 65.

CLARK, HAROLD, Toronto, Canada; University of Toronto, Dental Department, 1893; died December 14.

CLIFFORD, WILLIAM J., New York, N. Y. (formerly of Worcester, Mass.); died December 19.

CLINE, JEAN, Portland, Ore.; College of Dentistry, University of California, 1898; died December 24; aged 66.

CODDINGTON, RAY F., Crawfordsville, Ind. (formerly of Chicago, Ill.); Indiana University School of Dentistry, 1898; died January 17.

CONNLEY, EDWIN H., Covington, Ky.; Indiana University School of Dentistry; died November 18; aged 36. Dr. Connley was a captain in the Army Dental Corps, serving in the Fiji Islands at the time of his death.

CORRINGTON, CLYDE M., Flushing, N. Y. (formerly of Lincoln, Nebr.); Omaha Dental College, Dental Department of the University of Omaha, 1904; died January 2.

CRANE, EDWARD, New Orleans, La.; Tulane University of Louisiana, College of Medi-

cine, School of Dentistry, 1915; died January 14; aged 49.

DEASON, L. A., East St. Louis, Ill.; St. Louis University School of Dentistry, 1918; died December 29; aged 55.

DEWITT, WILLIAM PRICE, Cambridge, Mass.; Tufts College Dental School, 1899; died January 3; aged 72.

DOLAN, CLAUDE M., Cold Spring, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1901; died December 26; aged 68.

EDINBORO, ARTHUR C., Jamaica, N. Y.; Meharry Dental College, Dental Department of Meharry Medical College; died December 16; aged 41.

EDWARDS, GEORGE B., Laceyville, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1897; died December 21; aged 70.

EVANS, GEORGE P., Jackson, Miss.; Vanderbilt University, School of Dentistry, 1924; died in January; aged 51.

EVANS, WILLIAM M., Oak Park, Ill.; United States Dental College, Chicago, 1892; died December 29; aged 75.

FARMER, F. W., Watertown, N. Y.; Pennsylvania College of Dental Surgery, 1890; died January 10; aged 76.

FARROW, CAMPION B., Middleton, Conn.; Tufts College Dental School; died January 22; aged 44.

FISCHER, BERNARD W., New York, N. Y.; New York College of Dentistry, 1902; died December 29; aged 65.

FLOWERS, P. T., Vaiden, Miss.; died December 18; aged 66.

FOLEY, ESTER, Williamsburg, Ky.; University of Tennessee, College of Dentistry, 1896; died December 22; aged 72.

GALE, LYNN J., Albany, N. Y.; Pennsylvania College of Dental Surgery, 1882; died January 19; aged 80.

GARDNER, H. SCOTT, Martinsburg, W. Va.; University of Maryland, School of Dentistry and Baltimore College of Dental Surgery, 1909; died December 22; aged 56.

GOTT, WILLARD C., Cincinnati, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1907; died January 1; aged 58.

HACKER, T. S., Indianapolis, Ind.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1873; died January 9; aged 92.

HADLEY, AMOS I., Wayland, Mass.; Harvard University Dental School, 1891; died December 17; aged 74.

HARMANSON, LEWIS J., Onancock, Va.; Baltimore College of Dental Surgery; died December 25; aged 82.

HASTE, DAVID M., Memphis, Tenn.; died January 12; aged 71.

HENCHEY, BARTHOLOMEW F., Torrington, Conn.; Pennsylvania College of Dental Surgery, 1900; died January 16.

HERROD, REUBEN, Pittsburgh, Pa.; Temple University School of Dentistry, 1880; died January 5; aged 88.

HERTZ, J. D., Stamford, Conn.; Pennsylvania College of Dental Surgery, 1893; died November 26.

HEYMAN, JULIUS, New Brighton, N. Y.; College of Dental and Oral Surgery of New York, 1917; died January 20; aged 53.

HILL, WILLIAM H., Clarksburg, W. Va.; Cincinnati College of Dental Surgery, 1897; died January 9; aged 68.

HOLDEN, HARLEY W., Randolph, Vt.; Baltimore Medical College, Dental Department, 1900; died January 2; aged 69.

HOLTZ, WILLIAM A., Tiffin, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1903; died January 21; aged 69.

HOWZE, ENOCH S., Malvern, Ark.; Atlanta-Southern Dental College, 1918; died January 6; aged 49.

HUNT, EDGAR S., Logansport, Ind.; Indiana University School of Dentistry, 1896; died January 18; aged 70.

HUTCHISON, GEORGE M., Ridgeway, Pa.; died January 5.

IRVING, ALEXANDER A., Bridgeport, Conn.; New York College of Dentistry; died December 13; aged 57.

JACKSON, GEORGE A., Indianapolis, Ind.; Indiana University School of Dentistry, 1905; died January 23; aged 67.

JOHNSON, A. G., Newark, Ohio; Cincinnati College of Dental Surgery, 1904; died January 16; aged 63.

JOHNSON, W. B., Selma, N. C.; Northwestern University Dental School, 1909; died December 24; aged 54.

JONES, HARRY R., South Bend, Ind.; Indiana University School of Dentistry, 1916; died December 24; aged 49.

JOSEPH, REUBEN, Salt Lake City, Utah; died December 19; aged 42.

KERR, ALBERT, Cliffside Park, N. Y.; died January 22; aged 68.

KNAPP, GEORGE, Decatur, Ill.; State School of Dentistry, Indianapolis, 1928; died January 18; aged 41.

KNEE, SILAS CHARLES, Vinita, Okla.; died December 30.

LAYMON, G. D., Miami, Fla.; Indiana University School of Dentistry, 1908; died January 3; aged 64.

LEAVER, SIDNEY A., Salt Lake City, Utah; Chicago College of Dental Surgery, 1911; died January 9; aged 56.

LEE, FRANK, Red Bank, N. J.; died December 26; aged 70.

LEWIS, G. R., Little Rock, Ark.; Meharry Dental College, Dental Department of Meharry Medical College; died January 3.

LOVELL, ROBERT B., San Rafael, Calif.; College of Physicians and Surgeons of San Francisco, A School of Dentistry, 1914; died December 15; aged 52.

LUND, CARL A., Muskegon Heights, Mich.; University of Michigan, College of Dental Surgery, 1921; died December 30; aged 45.

MACKILLOP, KENNETH, Medford, Mass.; Tufts College Dental School, 1907; died January 16; aged 65.

MALLETT, GAVIN R., Denver, Colo.; School of Dentistry, University of Denver, 1922; died January 11; aged 46.

MALLINCKRODT, OTTO, Jackson, Mo.; Washington University School of Dentistry, 1892; died December 8; aged 73.

MARSHALL, JOHN S., Palmyra, Ind.; died January 9; aged 88.

MARTIN, J. A.; Lafayette, La.; Southern Dental College, 1897; died December 30; aged 72.

MEADER, FREDERICK E., Wolfeboro, N. H.; Harvard University Dental School, 1895; died January 7; aged 71.

MEANS, JOHN J., Fredonia, Kan. (formerly of Chanute, Kan.); Western Dental College, 1897; died November 15; aged 70.

MILHOLLAND, GEORGE V., Baltimore, Md.; Baltimore College of Dental Surgery, Dental School, University of Maryland, 1891; died in January; aged 73.

MILLER, RALPH, Cleveland, Ohio; University of Michigan, College of Dental Surgery, 1912; died December 20; aged 55.

MISHER, WILLIAM W., Chicago, Ill.; Illinois School of Dentistry, 1901; died January 24; aged 69.

MOORE, G. T., Bloomington, Ill.; died December 18; aged 85.

MOORE, NORMAN H., Lansing, Mich.; Northwestern University Dental School, 1900; died January 3; aged 74.

MOORE, THOMAS BENTON, Rising Sun, Md.; University of Maryland, School of Dentistry and Baltimore College of Dental Surgery, 1891; died December 15; aged 83.

MURPHY, FRANK H., Brookline, Mass.; Tufts College Dental School, 1916; died January 19; aged 47.

MYERS, J. E., Westminster, Md.; University of Maryland, School of Dentistry and Baltimore College of Dental Surgery, 1901; died in January; aged 69.

O'BRIEN, STEPHEN J., Yonkers, N. Y.; died December 22; aged 69.

O'CONNOR, JEROLD EDWARD, Wichita, Kan.; Kansas City Dental College, 1919; died December 6; aged 50.

O'DONNELL, J. B.: Johnstown, Pa.; University of Pittsburgh, School of Dentistry, 1914; died January 4; aged 56.

PAGE, CARL, Lancaster, S. C.; Atlanta Dental College, 1931; died November 13; aged 35.

PAUL, JACOB L., St. Louis, Mo.; St. Louis University School of Dentistry, 1913; died November 23; aged 55.

PHELPS, ARTHUR C., Camden, N. Y.; University of Buffalo, School of Dentistry; died January 19; aged 61.

PRYOR, J. H., Seminole, Okla.; died January 2.

RALSTON, ROBERT H., Cleveland, Ohio; Western Reserve University School of Dentistry, 1903; died January 19; aged 65.

RAWSON, CLARK H., Jamestown, N. Y.; College of Dentistry, University of California, 1890; died November 26; aged 81.

RAY, JOHN Z., Haverhill, Mass.; Tufts College Dental School, 1893; died November 9; aged 73.

REED, STANLEY H., San Francisco, Calif.; died January 1; aged 53.

REESE, RUDOLPH, Brooklyn, N. Y.; New York College of Dentistry, 1904; died January 3; aged 64.

REINECKE, H. L., Pittsburgh, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Penn-

sylvania, 1881; died December 18; aged 55.

REYNOLDS, FREDERICK E., Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1892; died December 17; aged 76.

RICHARDSON, R. C., Mt. Vernon, Ill.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati; died November 23; aged 69.

RICHMOND, JAMES B., New Orleans, La.; died January 4; aged 67.

RIERSON, NICHOLAS E., Bluefield, W. Va.; Baltimore College of Dental Surgery, 1903; died December 19; aged 72.

RITTER, CHRISTOPHER C., Indianapolis, Ind.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1889; died December 3; aged 86.

ROBERTSON, J. Q., Tonkawa, Okla.; Kansas City Dental College, 1903; died October 25; aged 77.

ROLAND, GEORGE E., Oklahoma City, Okla.; Western Dental College, 1911; died November 3; aged 54.

RUPPERSBERGER, C. ALBERT, Baltimore, Md.; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1914; died December 20; aged 49.

RYAN, GEORGE W., Lincoln, Kan.; Western Dental College, 1907; died November 1.

SCOTT, JOHN, Philadelphia, Pa.; Temple University School of Dentistry, 1900; died December 25; aged 66.

SEARS, WALTER H., Worcester, Mass.; Harvard University Dental School; died December 9; aged 92.

SELBY, C. A., Tulsa, Okla.; Western Dental College, 1904; died December 30; aged 69.

SHANAHAN, WILLIAM J., Brooklyn, N. Y.; University of Buffalo, School of Dentistry, 1924; died December 21; aged 43.

SHELDON, EDWARD J., Lowell, Mass.; Tufts Dental College, 1922; died December 9.

SHEPPARD, R. A., Englewood, N. J.; New York College of Dentistry, 1895; died November 30; aged 70.

SHIELDS, JAMES S., Brooklyn, N. Y.; New York College of Dentistry, 1910; died January 10; aged 56.

SHIRLEY, M. P., Baldwyn, Miss.; Atlanta Dental College, 1906; died November 15; aged 65.

SIDENBENDER, JOSEPH C., Indianapolis, Ind.; Indiana University School of Dentistry, 1919; died November 19; aged 49.

SIML, BOHUSLAV, Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1918; died November 26; aged 56.

SIMPSON, JAMES W., Larchmont, N. Y.; Temple University School of Dentistry, 1901; died December 27; aged 72.

SLINKARD, RUSSELL F., Terre Haute, Ind.; Indiana University School of Dentistry; died January 5; aged 51.

SMITH, HENRY J., Murray City, Utah.; died November 13; aged 86.

STANFILL, C. M., Tucumcari, N. M.; American College of Dental Surgery, 1891; died January 15.

STARK, THOMAS A., San Francisco, Calif.; College of Dentistry, University of California, 1902; died November 16; aged 67.

STEGMAN, FRED H., Baltimore, Md.; Baltimore College of Dental Surgery, Dental School, University of Maryland, 1919; died in November; aged 51.

STEWART, E. E., Thompson, Iowa; Keokuk Dental College, 1903; died November 6; aged 72.

STEWART, GEORGE B., London, England (formerly of Grand Haven, Mich.); University of Michigan, College of Dental Surgery; died in October.

STEWART, LEE K., San Diego, Calif.; Temple University School of Dentistry, 1886; died January 18; aged 78.

SUTHERS, W. A., Corwith, Iowa; State University of Iowa, College of Dentistry, 1902; died January 12.

TARRANT, FELIX I., Birmingham, Ala.; died December 13; aged 80.

TAYLOR, WALTON E., Hollywood, Calif. (formerly of St. Joseph, Mo.); Western Dental College, 1900; died January 9.

THOMAS, HOWARD W., Aberdeen, S. D.; University of Minnesota, College of Dentistry, 1906; died December 6; aged 59.

THOMPSON, J. W., Murphy, N. C.; Southern Dental College, 1903; died December 13; aged 73.

THORELIUS, PETER WILLIAM, Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1891; died December 1; aged 77.

TRUSTY, WILLIAM F., Greensburg, Ky.; University of Louisville, School of Dentistry, 1901; died October 2; aged 70.

TURLEY, THOMAS JEFFERSON, Richmond, Ky.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1914; died December 25.

TYRELL, FREDERICK F., Seattle, Wash.; died December 21; aged 63.

UNDERWOOD, AMOS P., Woodbury, N. J.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1904; died January 18.

UNDERWOOD, WILLIAM E., Fond Du Lac, Wis.; Northwestern University Dental School, 1899; died January 17; aged 70.

UNGER, NATHAN, Cincinnati, Ohio; New York College of Dentistry, 1902; died December 9; aged 49.

VAIL, CLINTON T., Yonkers, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1911; died December 26; aged 54.

VANDERPOOL, LESLIE J., Philadelphia, Pa.; Medico-Chirurgical College of Philadelphia, Department of Dentistry, 1902; died December 8; aged 65.

VAN DE WATER, ISAAC NOSTRAND, Madison, N. J.; Baltimore College of Dental Surgery, 1880; died December 3; aged 89.

VIA, GEORGE O., Northfork, W. Va.; University of Maryland, School of Dentistry and Baltimore College of Dental Surgery, 1916; died December 30; aged 49.

WAIT, M. L., Augusta, Ill.; Northwestern University Dental School, 1901; died December 8; aged 67.

WARD, CHARLES D., Tigard, Ore.; died December 30; aged 66.

WAYMAN, WALTER NEWTON, Marshall, Va.; College of Jersey City, Department of Dentistry, 1900; died November 21; aged 63.

WEAVER, CLARENCE R., Modesto, Calif.; died January 3; aged 80.

WELCH, FRANCIS W., Springfield, Mass.; Tufts College Dental School, 1916; died December 5.

WEST, J. B., Willoughby, Va.; School of Dentistry, Medical College of Virginia, 1919; died December 16; aged 46.

WHARTON, JAMES LOGAN, Detroit, Mich.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1916; died November 23; aged 66.

WHEDON, WILLIAM H., Detroit, Mich.; Chicago College of Dental Surgery; died December 15; aged 89.

WICKS, PARKE W., Syracuse, N. Y.; Pennsylvania College of Dental Surgery, 1886; died November 23; aged 81.

WILKINSON, W. FREDERICK, Warrensburg, N. Y.; Baltimore College of Dental Surgery, 1896; died January 12; aged 71.

WILLIAMS, JONATHAN, West Palm Beach, Fla. (formerly of Albany, Ga.); Atlanta-Southern Dental College, 1925; died December 6; aged 41.

WILSON, MICHAEL, New York, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1906; died December 5; aged 59.

WRIGHT, M. J., Tulsa, Okla.; died December 5; aged 78.

YOUNG, LEWIS A., Deadwood, S. D.; State University of Iowa, College of Dentistry, 1927; died November 26; aged 40.

YOUNG, ROBERT W., Cambridge, Mass.; Tufts College Dental School, 1899; died January 12; aged 75.

ZARTZIN, ABNER J., Milwaukee, Wis.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1898; died December 4.

INCIDENTS OF PRACTICE

Convenient Angulation Guide for Maxillary Intra-Oral Films

HARRY B. JOHNSTON, D.D.S., Atlanta, Ga.

ONE of the major hazards in intra-oral roentgenography is angulation of the tube in relation to the superior teeth and the film packet so as to neither shorten nor elongate the teeth. At present, only two methods seem to be in vogue for determining this angle, the "guess" method and the rather complicated one advocated by the makers of the x-ray apparatus. Neither of these can be used with much success until the operator has, by "trial and error" in the use of the chosen method, become an expert.

A guide already exists in the most convenient possible place by which even the most inexpert can be virtually sure of determining the right angle quickly and easily no matter what the position of the patient's head. This guide, which is accurate in about twenty-four cases out of twenty-five, consists merely of the line of the nose, from base to tip. I have found, over several years of close observation, that this line definitely marks the median angle between the slope of the hard palate and the inclination of the upper teeth. The patient may be sitting bolt upright or may be completely supine.

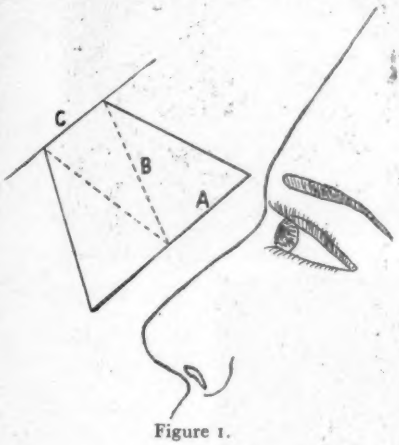


Figure 1.

With the inverted cone on the tube, it is much easier to make an adjustment to this line than with the pointed cone, as one merely has to line up the long straight baseline of the cone to parallel the nose line, and, ninety-five times out of one hundred, it will be just right. The pointed cone can be used, but, in this case, the baseline will

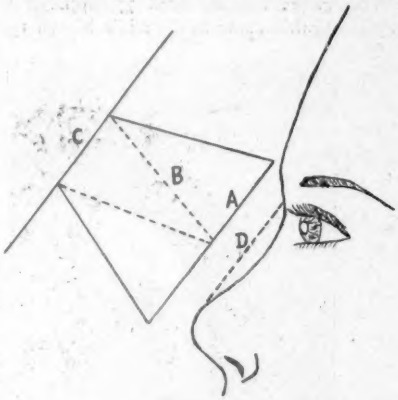


Figure 2.

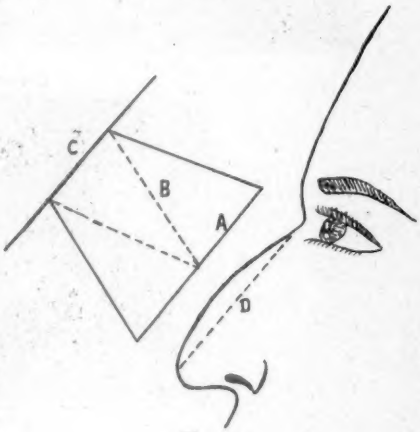


Figure 3.

consist of the base of the tube case; which throws the two base lines so far apart that their accurate paralleling is more difficult.

The nose line is a straight line from the base to the tip, disregarding anatomic "humps" and "hollows" of the bridge. This guide applies to all the upper teeth from

central incisors to third molars, if they are in approximately normal position.

Candler Building.

Unusual Stone in Wharton's Duct

M. W. GREENBAUM, B.S., D.D.S.; D. G. FRANK, B.A., D.D.S., and E. WHYNMAN,* D.D.S., New York, N. Y.

History.—A woman, aged 77, apparently in good health, came to the clinic March 15, 1943, complaining of a moderate pain and a transient swelling of the floor of the mouth on the right side, of which she was aware during meal time. She had been wearing full dentures for about twelve years, and had noticed this condition for the past seven years. She visited her dentist from time to time during this period of seven years, and so far as she is able to determine, the dentist adjusted the lower denture to alleviate her difficulties.

Examination.—Clinically, a large hard mass could be palpated in the area covering Wharton's duct. Occlusive films and lateral plates revealed a large stone. (Figs. 1 and 2.)

Operation.—The calculus was removed intra-orally two days later (March 17) under local anesthesia. The anterior tip of the stone was of a caseous-like consistency and it crumbled when grasped by the thumb forceps. The remainder of the stone was comparatively hard. The posterior portion was hooked upward and slightly twisted at the anterior part of the submaxillary gland. This made it necessary to rotate the stone in order to remove it. Recovery was speedy and uneventful.

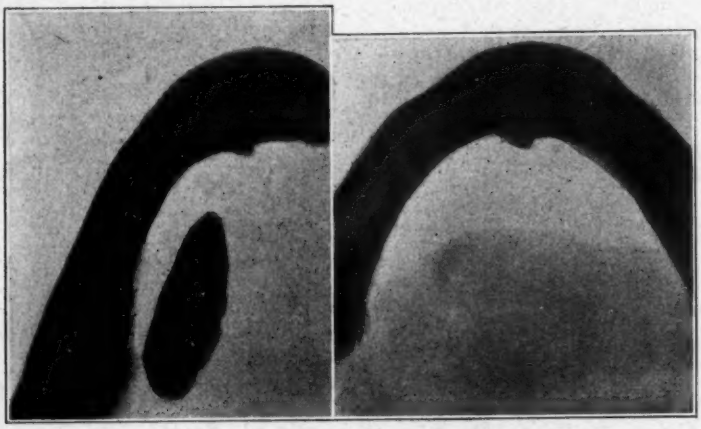


Figure 1.

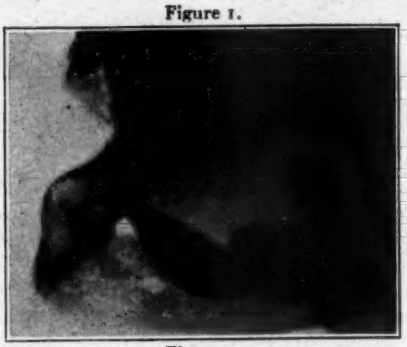


Figure 2.

*Chief, Division of Dentistry, New York Polyclinic Medical and Hospital.

The calculus measured 26 mm. anteroposteriorly on removal. Since this was not the true length because of the crumbling of the tip, a determination of its actual size was made by using the measurements of the roentgenogram and the recovered mass. On this basis, the actual length was found to be 32 mm. The length of the hooked portion was actually 19 mm.

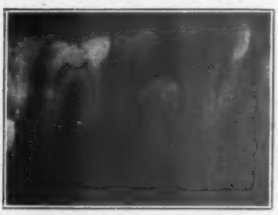
This report is made because of tolerance of the large calcareous mass for a period of seven years in the presence of apparently functioning full dentures, and because of what seems to have been an incomplete investigation of the etiology of the complaint.

355 West Fiftieth Street.

Impacted Bicuspid

M. W. KLEIT, D.D.S., Teaneck, N. J.

A MAN, aged 23, who complained of pain



Roentgenogram showing unerupted bicuspid.

on the lower right side, on examination presented a large distal cavity in the lower right "first" bicuspid, involving the pulp chamber. X-ray examination disclosed the presence of an unerupted or impacted bicuspid in addition to the two visible in the mouth. X-ray studies of similar areas failed to disclose any similar condition. It has not been my experience to see a similar condition, although I have seen a number of so-called fourth molars.

Comments as to the possible frequency of this anomaly would be of interest.

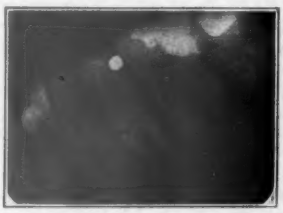
405 Cedar Lane.

Anomalous Premolars

WALTER H. JACOBS, D.D.S., New York, N. Y.

THE accompanying roentgenogram of the lower right mandibular area shows an interesting formation of the bicuspid roots. In this case, both premolars have two roots, one mesial and one distal, instead of the usual single root.

Among the differences that distinguish anthropomorphous apes from man is that



Premolars with two roots.

the lower premolars in the apes are implanted by two roots. Tomes[1] believes this anomalous formation, not uncommon in man, to be a reversion. At any rate, it emphasizes the importance of the x-rays in all dental treatment.

1. TOMES, C. S.: Manual of Dental Anatomy. New York: Macmillan Co., 1923.

CURRENT LITERATURE

Journal of Dental Research

October 1943

Titles marked with an asterisk are reviewed below.

The Fate of Bacteria Sealed in Dental Cavities. F. C. Besic, University of Illinois—349

*Dental Conditions Among Prehistoric Indians of Kentucky (The Indian Knoll Collection). Samuel Rabkin, Cincinnati, Ohio—355

*Changes in Caries Susceptibility with Age and Sex. B. Y. Burrill, Northwestern University—367

*Chemical Studies on Periodontal Disease D. B. Law, M. Berg, and L. S. Fosdick, Northwestern University—373

Use of Metal Plates for Testing the Abrasiveness of Dentifrices. M. L. Tainter and Sidney Epstein, College of Physicians and Surgeons—381

*Human Saliva. XIII. Rate of Flow of Resting Saliva of Healthy Individuals. H. Becks and W. W. Wainwright, University of California—391

*Human Saliva. XIV. Total Calcium Content of Resting Saliva of 650 Healthy Individuals. H. Becks, University of California—397

*Human Saliva. XV. Inorganic Phosphorus Content of Resting Saliva of 650 Healthy Individuals. W. W. Wainwright, University of California—403

*Testing Caries Activity by Acid Production in Saliva. E. G. Wach, R. G. Kesel, M. K. Hine and J. F. O'Donnell, University of Illinois—415

Dental Conditions Among Prehistoric Indians of Kentucky

SAMUEL RABKIN

EXAMINATION of assembled calvaria of prehistoric American Indians of Kentucky (Indian Knoll remains) discloses contrasting variations in their physical and dental structure characterized by corresponding diversity in shape and size of the jaws and teeth and distinct contrasts in the bone formation of the respective skulls. No doubt, the tendency toward these diversities was established among the Indians prior to their reaching the western hemisphere. Some newly developed traits, such as torsion of the incisors and the elevation of labial marginal ridges of the maxillary incisors exhibited in the specimens may have occurred after these shores were reached and have been transmitted hereditarily. The incidence of tooth decay was comparatively low among the prehistoric Indians. Likewise, the tendency toward periodontal disorders was not so prevalent as it is today. It occurred only among those who had reached the later stages of life. Massive bone formation of the alveolar process of the upper and lower jaws, providing added support to the teeth, are distinguishing features among the large headed types.

Changes in Caries Susceptibility with Age and Sex

D. Y. BURRILL

CARIES susceptibility determinations were made for 3,487 patients by salivary bacterial counts and for 458 patients by chemical determinations. Mean values indicate a tendency for caries susceptibility to be higher in both sexes at some time between 13 and 21 years of age than before or after. According to bacterial determinations, greatest susceptibility for males occurs from 13 to 18 years, and at this time males are more susceptible than females. Females are most susceptible at 19 to 21 years, when they are more susceptible than males. Chemical determinations indicate peak susceptibility for females at 16 to 18 years and for males at 16 to 21 years, with females more susceptible than males at 13 to 15 years and less so at 19 to 21 years.

Chemical Studies on Periodontal Disease

D. B. LAW, M. BERG and L. S. FOSDICK

THE saliva from normal persons and the saliva from persons suffering from periodontoclasia were allowed to putrefy at 37.5° C. Samples of each type of saliva were removed at intervals during the period of putrefaction and analyzed for protein hydrolysis and for odor intensity. It was found

that the average rates of putrefaction were considerably higher in the saliva from the persons with periodontal disease.

Human Saliva. XIII. Rate of Flow of Resting Saliva of Healthy Individuals

HERMANN BECKS and W. W. WAINWRIGHT

THE mean rate of flow of saliva in 661 individuals was 19±0.54 cc. per hour with a standard deviation of 14±0.38 cc. per hour and a total observed range from 0.5 to 111 cc. per hour. The distributions showed a tapering off toward high values, with a comparatively high skewness value and coefficient of variation. The coefficient of correlation with age was nearly zero for the entire group, while a slight relationship existed in persons from 5 to 29 years. No sex differences were found between the average rates of flow for males, 20±0.81 cc. per hour, and females, 19±0.96 cc. per hour, either between five-year groups within each sex group or between the sexes at similar age levels.

Human Saliva. XIV. Total Calcium Content of Resting Saliva of 650 Healthy Individuals

HERMANN BECKS

THE average calcium value of resting saliva for 650 individuals was 5.8±0.06 mg. per hundred cubic centimeters, with a standard deviation of 1.4±0.04 mg. and a total observed range from 2.2 to 11.3 mg. The distribution approached a symmetrical curve with a comparatively low skewness value and coefficient of variation, which were much less than those of rate of flow. A slight relationship between total calcium in milligrams per hundred cubic centimeters and age was reflected by a greater correlation coefficient in the group from 5 to 29 years than for the entire group. The means of five-year age groups increased slowly and reached a maximum in middle life. The results for 650 individuals gave a mean of 1.06±0.03 mg. per hour, a standard deviation of 0.80±0.02 mg. per hour and a total observed range from 0.12 to 6.28 mg. The distributions tapered off toward high figures giving a large skewness value and coefficient of variation like those of rate of flow. In contrast to the milligrams per hundred cubic centimeter studies, no relationship between total calcium in milligrams per hour values and age was found, which was reflected in the zero correlation coefficient. In younger individuals, a slight relationship was observed. In the total groups, the standard deviation in milligrams per hundred cubic centimeters was much smaller in relation to the range than that of milligrams per hour. This fact assumed greater significance when its effect on the skewness values and coefficients of variation was noted. Both of these figures were much lower for milligrams per hundred cubic centimeter values, which had the more compact distribution. The milligrams per hundred cubic centimeter means of five-year groups showed more definite changes with age since they were significantly different up to 19 years; while, for milligrams per hour, this was true only up to 14 years. Moreover, comparison of the larger groupings of 5 to 29, 30 to 49 and 50 to 95 years also emphasized the greater relation between milligrams per hundred cubic centimeter values and age since the means of these groups were all significantly different and increased progressively with age. On the other hand, none of these groups differed significantly for milligrams per hour values. A similarity between milligrams per hundred cubic centimeters and milligrams per hour values was seen in their correlation coefficients, which in each case were stronger in the youngest groups; i.e., up to 30 years. For the total groups, the relationships disappeared. The possibility of a sex difference was slight for the milligrams per hundred cubic centimeter figures, while for the milligrams per hour none could be found.

Human Saliva. XV. Inorganic Phosphorus Content of Resting Saliva of 650 Healthy Individuals

W. W. WAINWRIGHT

THE mean for 650 individuals was 16.8 ±0.25 milligrams per hundred cubic centimeters with a standard deviation of 6.4± 0.18 mg. and a total observed range from 6.1 to 71.0 mg. The frequency distribution was only slightly skewed and the coefficient of variation was also comparatively low. In general, there was a slight gradual rise in phosphorus values with increasing age up to approximately 50 years. The correlation between phosphorus and age was greater for

the entire group of 650 than for the individuals from 5 to 29 years. All of the combined age groups, 5 to 29, 30 to 49 and 50 to 95 years, were found to differ significantly from each other and showed an increased phosphorus content as age advanced. The mean of inorganic phosphorus in milligrams per hour for 650 individuals was found at 3.06 ±0.07, with a standard deviation of 1.89 ±0.05 and a total observed range from 0.21 to 16.75. The distribution was skewed and the coefficient of variation was much greater than that of milligrams per hundred cubic centimeters. The wide distributions gave no correlation between phosphorus and age in the entire group. When only the early values from 5 to 29 years were considered, an increase in the correlation coefficient occurred and slight relationship was found. For phosphorus the differences between milligrams per hundred cubic centimeters and milligrams per hour findings were identical with those noted for calcium, with one exception. The correlation coefficient of milligrams per hundred cubic centimeters of phosphorus was greater for the entire group, while, for milligrams per hour, it was greater for persons from 5 to 29 years, as was also noted for milligrams per hour calcium. Owing to the lack of definite ranges for specific age groups and the great overlapping of the distributions, it is impossible to set up a normal standard for any specific age group or for the total group. The salivary examinations just reported provide representative groups through a wide range of ages of healthy persons of both sexes. Great differences in salivary composition were found in the different age groups and at different levels of rate of flow.

Testing Caries Activity by Acid Production in Saliva

E. C. WACH, R. G. KESEL, M. K. HINE and J. F. O'DONNELL

A QUICK, simple, accurate method of evaluating dental caries activity before the actual dissolution of enamel begins will be a valuable aid in the studies and treatment of dental caries. In this report, the following method is described: A mixture of 3 cc. of unstimulated saliva and 0.4 cc. of 1 per cent glucose solution is incubated for four hours and then the pH and total titratable acidity are determined. Tests on salivary samples from patients clinically caries immune show very little pH and total acidity change, but tests on salivary samples from caries active patients show a rapid depression of pH and increase in total titratable acidity.

An analysis of more than 2,000 tests on approximately 200 patients reveals the following: 1. A correlation of 86 per cent was found between the test and the clinical presence of caries activity. 2. A subject found clinically caries inactive may be passing into an active stage. 3. A subject found clinically caries active may be passing into an inactive stage. 4. The *Lactobacillus acidophilus* count, while fairly consistent with the clinical findings, is subject to the same variations. 5. A few cases (less than 1 per cent) are encountered in which a high acid production is found with no clinical caries. 6. A single application of this test is not sufficient to determine the dental caries activity. Results of several tests which show a definite trend give reliable indications of caries activity.

A Study of Fluoride Domestic Waters and Dental Caries Experience in 263 White Illinois Selective Servicemen Living in Fluoride Areas Following the Period of Calcification of the Permanent Teeth

By CHARLES F. DEATHERAGE

A STUDY of 549 white adults lends further support to the fluorine-dental caries hypotheses. The domestic waters used by selectees were grouped into two broad divisions: fluoride free (0.0-0.1 part per million of fluorine) and fluoride (1.0 part per million and over). Individuals were classified according to whether they had used the domestic water in question (a) during their entire life or (b) after calcification of the permanent teeth (first eight years).

The dental caries experience of 263 selected white selectees who had lived where the public water supply contained 1.0 part per million or more of fluorine from one to twenty-four years after calcification of the permanent teeth had a total dental caries rate of 838, while the dental caries experience of 286 white selectees who were born and had lived their entire lives in munici-

palities in fluoride-free areas had a rate of 1,079. The selectees who had lived in fluorine areas after the period of calcification of the permanent teeth have an untreated dental caries rate of thirty-three less, filled rate of 161 less, extractions indicated of eighteen less and missing rate of thirty less and a no caries experience rate of 241 more than those living in areas where the public water supplies were fluoride free.—*J. D. Res.*, 22:173, June 1943.

Journal of Dental Education

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Transition from the Preclinical Laboratory to the Clinic

CHARLES W. CRAIG

THE importance of adequately preparing students for the period of transition from the preclinical laboratory to the clinic is generally recognized. Commendable as approaches, but not to be considered a solution to the problem, are clinical demonstrations and the use of the manikin in the sophomore technical laboratories.

Our failure to prepare the students adequately for the transition is manifested by the misgivings with which many enter the clinic. By permitting the student to actually participate in clinical practice early in his sophomore year, much can be done toward dispelling these apprehensions.

At the University of California, second term freshmen are introduced to clinical activities by a series of clinical demonstrations and instruction in the principles of mouth hygiene and the technic of scaling. Sophomores spend sixty hours in the clinical practice of mouth hygiene. An examination of each mouth hygiene patient for caries and an examination of the soft tissues are made, and the findings recorded.

Clinical experience thus gained fortifies the student with poise and confidence, and, with decreasing timidity, he learns to adapt himself to the surroundings and requirements of the clinic. The system has proved highly successful from the standpoint of teaching and has been of inestimable value in solving many of the problems associated with the transitional period.

The Aims and Implementation of a Graduate Course in Dentistry

EUGENE W. SKINNER

THE education of prospective dental specialists at the graduate level may require special educational technics. The course should not be aimed to produce a completely finished product, but rather to provide a basis and a desire for future self-development on the part of the student.

The dental graduate program should be administered by the graduate school of the university in cooperation with the dental faculty. This relationship should be productive in ideas and contributions to educational policy.

Although a baccalaureate degree is desirable, entrance requirements to dental graduate study may be held at present to the completion with distinction of a four-year dental course in a recognized dental school. Other factors to be considered in selection of students are professional standing, personal motivation, age and number of students to be admitted. The number and type of courses to be given must be carefully considered.

The completion of some original research, to be reported as a thesis, should be required of every student.

Dental Internship

R. A. ATTERBURY

HOSPITAL authorities and dental educators are becoming aware of the value of the dental internship and the need of a well-organized dental service within the hospital to give complete health service to the patient and to afford the young dental graduate an opportunity to gain a greater understanding of the oral cavity in relation to the rest of

the body. The internship at the University of Illinois Research and Educational Hospital offers regular services in diagnosis, principles and practice of public health problems, oral and plastic surgery, diagnostic dental radiology, pediatrics and pedodontic health problems, anesthesia and any special field of interest that the intern may be interested in. Like any other department in the hospital, the department of dentistry, represented by the dental intern, acts as dental consultant whenever requested. The internship, along with the close association with physicians on the staff, adds much to the technical ability, maturity of judgment and self-confidence of the dental graduate.

The Teaching of Stomatology to Medical Students

MAURY MASSLER

THE medical student has been incompletely trained for his life's work if he has had no instruction in the fundamentals of stomatology. The physician is often called upon to diagnose diseases of the oral cavity and to relate his findings to the ailments of the patient. A course in stomatology should teach the fundamentals of oral anatomy, physiology and pathology in non-technical terms. Emphasis should be placed on (1) the cause, diagnosis and treatment of common dental and oral lesions; (2) recognition of the mouth and its accessory structures as foci from which infection may spread to other areas of the body, and the routes of such dissemination, and (3) the oral cavity as an area in which systemic disease may be manifested. Clinical correlations and examples should be presented at each discussion.

Zinc-Oxide and Eugenol in Operative Dentistry

GRANT VAN HUYSEN AND CONSULTANTS

VAN HUYSEN, referring to previous research findings, concludes that the cutting of dentin during operative procedures upon young teeth constitutes trauma of the tubules and the pulp. This trauma results in an inflammatory type of pulp reaction, which is, as a rule, followed by proliferation of dentin. It is stated that the application of zinc oxide and eugenol to the cut dentin surface and as a base for fillings will palliate the effects of operative trauma and thus mitigate the severity of the inflammatory pulp reaction.

Most of the consultants upheld this view. One of them suggested the use of calcium hydroxide to promote secondary dentin formation. There also seemed to be a feeling that pulpal irritation during operative procedures is of some value in increasing the protective proliferation of dentin. This is, of course, correct, provided one can adequately control such action, particularly when it is inflammatory.

Food and the War

PAUL R. CANNON

THIS paper is an over-all discussion of the importance of food as a weapon of war, and of the medical aspects of food scarcity. Starvation is emphasized as the most important world disease today, related, with its associated protein deficiency, to resistance to infection. The entire mechanism of acquired immunity is but a part of the process of protein metabolism and antibodies are protein substances and can be produced only when there is an adequate supply of proteins of good biologic quality in the diet. In starvation, this is lacking; hence the common association of poverty, starvation and pestilence.—*Illinois D. J.*, 13:3, January 1944.

Challenging Current Concepts of Balance in Full Dentures

JESSE V. BOSWELL

SUBSTITUTE dentures are mechanical devices and subject to the laws related to the inclined plane and lever. Therefore, successful service depends on knowledge of true functional movements of the mandible and laws relative to the inclined plane and lever. In masticatory function, the mandible moves from open eccentric position toward centric occlusion position, not in occlusional glide. The size, resistance and position of food morsels between the teeth will determine the directional movements of the mandible and not the condyles. The condyles, and glenoid fossae receptacles, constitute adjustable fulcrums and bearings for the mandible, a lever of third class. Accommodators balance the lever for effectiveness. The record of the occlusion path is not a record of full-range mandibular movement, but merely registration of certain predetermined positions in

one fixed vertical dimension only. It does not afford functional balance. The concept of balanced occlusion in spherical form is erroneous. It develops occlusal pitch of the upper posterior teeth into an inclined plane with outwardly directed force against the standing lever of the lower teeth. Dentures must have balance against mastication forces apart from and not related to occlusion.—*Illinois D. J.*, 12:530, December 1943.

Sulfathiazole and Sulfadiazine Prophylaxis in Exodontia

PHILIP S. FAILLO

CHEMOTHERAPY using the sulfa drugs is changing the mode of treatment of many diseases in medicine and dentistry. Sulfathiazole is being used locally in both major and minor surgery. To evaluate the use of the sulfa drugs locally and intra-orally as a prophylactic against probable subsequent infection following the removal of difficult impacted teeth, twenty-five patients who presented difficult extraction problems were selected and sulfadiazine was given orally and sulfathiazole applied locally to the extraction wounds. The results were gratifying in that in no case was recovery from the extraction wounds followed by infection or extreme postoperative pain. Caution and good judgment must be exercised in the administration of these drugs as their indiscriminate use is dangerous.—*Illinois D. J.*, 13:15, January 1944.

Development of a Tooth in a Grafted Area

MARTIN A. RUSHTON

IN the case of an 11-year-old boy with a congenital deformity involving severe hypoplasia of the posterior part of the mandible on one side, the bone was divided immediately behind the second molar, and a bone graft about 1 inch long, taken from the crest of the ilium, was inserted. The mandible was repositioned and splints were applied. Nearly two years later, long after complete consolidation of the graft, an area resembling a dental crypt immediately back of the second molar crown was noted in a roentgenogram. After another year, the crypt was seen to contain a third molar germ, five distinct tooth cusps being visible. Apparently, when the mandible was severed, the anlage of the tooth was left in the area closely adjacent to the graft, and subsequently the crypt developed in the new bone. The author concluded that perhaps the provenance of the mesodermal elements involved in formation of the tooth-crypt is unimportant, and that bone of an indifferent type can react to the presence of the anlage as well as those elements normally predestined to do so.—*Brit. D. J.*, 75:281, December 1943.

DAVID B. SCOTT.

Percussion Note of the Maxillary Sinus

WILLIAM NEWSON

PERCUSSION as a means of antrum examination depends on accurate audition by the observer. A normal adult maxillary sinus satisfies the structural requirements for production of a tympanitic note by percussion. The quality of the resultant note indicates the amount of air in the sinus; impairment of the note, the presence of abnormal conditions. The results of such diagnosis do not always agree with those of other diagnostic methods, but the method is accurate and reliable, at least as a check.—*Arch. Otolaryn.*, 38:350, October 1943.

DAVID B. SCOTT.

Trichlorethylene and Trigeminal Anesthesia

J. MCAULEY

IN three cases of bilateral trigeminal anesthesia following administration of trichlorethylene, typical muscle trismus and anesthesia of the mucosa were noted, with loss of the corneal reflexes, dryness of the nares and lisping. Apparently, the gasserian ganglion was affected. There seemed to be no relation between the dose administered and the resultant trigeminal anesthesia, and no means of testing the susceptibility of the patient.—*Brit. M. J.*, December 4, 1943.

DAVID B. SCOTT.

Effect of Simultaneous Vitamin A and Vitamin D Deficiency on the Denture of the Incisor Tooth of the Rat

J. T. IRVING

FIVE albino rats were for thirty-eight days kept on a rachitogenic diet, which was also deficient in vitamin A, after which histologic studies were made of upper incisors, and

line-tests made on epiphyses of the radii and ulnae. It was found that the incremental growth of the incisal dentin was greatly reduced and that an unusual marked dentinal stratification, not found in deficiency of either vitamins A and D, appeared.

These striations were absent from the extreme proximal end of the tooth, wide in the intermediate part and narrower in the distal end. From histologic analyses, it appeared that vitamin A deficiency began to act on the tooth, already handicapped by deficiency in vitamin D, after about sixteen days, and from then on inhibited calcification, so that only striations could be formed. The only comparable histologic appearance that the author had met was seen in acute magnesium deficiency. In the absence of vitamin D alone, calcification is delayed, but with the extra deficiency of vitamin A, only intermittent calcification can take place. —*D. Rec.*, 63:281, December 1943.

DAVID B. SCOTT.

Burns of the Ear, Nose, Mouth and Adjacent Tissue

ARCHIE E. CRUTHIRDS

FIFTY cases involving burns of the ear, nose, mouth and adjacent tissues were treated with a sulfhydryl-yielding solution (hydrosulfosol). Healing was prompt, and no clinically significant infection or drug toxicity resulted. The drug supposedly increases epithelial proliferation and its use prevents or abates infection. When it is employed as a spray, a protective eschar can be safely formed on the face. The drug can also be used in wet compresses. Rapid healing is a decided advantage in facial burns, as it is usually associated with reduced scar-tissue formation. The ability to prevent infection eliminates completely or at least minimizes the need for extensive débridement.—*Laryngoscope*, 53:428, July 1943.

DAVID B. SCOTT.

Decreased Phosphorus Appetite of Parathyroidectomized Rats

C. P. RICHTER and S. TELFRICK

IN eight parathyroidectomized rats, there was a decreased intake of 1 per cent dibasic phosphate solution and increased intake of plain water following the operation. The diet remained the same before and after operation. Daily injection of parathormone in four rats increased their level of phosphate intake to normal and decreased the water intake. There was no definite effect on the food intake. This is another example of the ability of animals to select desirable diets.—*Endocrinology*, 33:349, December 1943.

DAVID B. SCOTT.

Paget's Disease in the Maxilla, Mandible and Palate

IRVING GLICKMAN

STUDY of the salient morphologic features of the maxilla, mandible and palate involved in Paget's disease revealed areas in which bone marrow spaces were filled with a dense network of connective tissue cells and fibrils. Alteration of bone was seen, the normal structures being replaced by a honeycomb of newly formed bone trabeculae. Fatty marrow was replaced by vascular connective tissue in no regular pattern. In zones of bone formation, both degeneration and osteoclastic activity were seen. There was a similarity between the changes observed in the bones studied and those seen in the remainder of the skeletal system in Paget's disease. In comparing the histologic findings on the jaw bones in Paget's disease and in individuals without this condition, it was seen that all of the individual histologic changes seen in Paget's disease could be duplicated in persons free from the disease.—*Am. J. Orthodontics*, 29:591, November 1943.

S. J. FANALE.

Effect of Changes in Barometric Pressure upon Dental Fillings

J. S. RESTARSKI

ONE hundred and fifteen amalgam, cement-silicate and oxyphosphate of zinc cement fillings were placed in freshly extracted human teeth. Although the cavities were of uniform depth and diameter, the filling materials were manipulated so as to control the properties and qualities of the completed fillings. After the apical thirds of the roots were coated with sticky wax and embedded in artificial stone, the teeth were placed in a pressure chamber and exposed to barometric changes. Altitudes of 10,000

to 30,000 feet were simulated without displacement of any filling. Then the barometric pressure was decreased so as to simulate an altitude of 60,000 feet, being maintained intermittently for twenty periods of one hour each with no displacement of any filling. The author concludes that restorations, even though made with poorly manipulated filling materials or with air spaces present, will not be displaced.—*U. S. Nav. M. Bull.*, 42:155, January 1944.

S. J. FANALE.

Bleeding Gums in Naval Ratings

A. C. MACDONALD

EXAMINATION of naval men on three seagoing ships and on one depot ship revealed an incidence of 28 per cent with bleeding gums or gingivitis. The diet was adequate and good results were obtained by local treatment alone in from five to nine days. No vitamins were given. The efficacy of the various antiseptics was studied. The use of chromic acid 10 per cent followed by hydrogen peroxide in one minute apparently had the best results. In the majority of cases, the teeth were thoroughly scaled before application of the medicament. Scaling is considered of prime importance. Intravenous arsenicals seemed to be effective in faucial infections, and to improve acute ulcerative gingivitis, but their use had no visible effect on the more chronic cases.—*Lancet*, 2:697, December 4, 1943.

S. J. FANALE.

Rate of Occurrence of Epithelial Tissue in Periapical Lesions

CARL A. SCHLACK

SINCE it is generally believed that epithelial tissue inclusions when stimulated may proliferate to produce cysts of different types, the author undertook to make histologic studies of periapical tissues removed from the alveolus, either together with the extracted tooth or by a curet after removal of the tooth. Of the 103 periapical lesions sectioned and examined, forty-three contained epithelial tissue in various stages of differentiation. This agrees well with several other investigations. It is thought advisable to remove these periapical lesions routinely at the time of extraction.—*U. S. Nav. M. Bull.*, 42:158, January 1944.

S. J. FANALE.

Use of Acrylic and Elastic Resin Prostheses for Facial Deformities

E. SWEEZEY, H. BAXTER and R. COXEMAN

ACRYLIC resins, now being used in making surgical prostheses, possess the properties of lightness, transparency and ease of manipulation. They are unaffected by ordinary temperatures, moisture and light; are inexpensive and easily duplicated, and can be stained in a gradation of shades. The materials are tolerated by soft tissues.—*Canad. M. A. J.*, 50:16, January 1944.

S. J. FANALE.

Some Considerations Concerning the Roentgen Diagnosis of the Skull

J. C. KENNING with S. D. HARRIS

ROENTGENOGRAPHIC examination of 50,000 skulls in order to study the extent of injury revealed fractures in 9,000. Arbitrary division of the skull into three sections showed that 26.8 per cent of the fractures were located in the anterior third, including the frontal area; 45.3 per cent in the middle third, including the parietal, sphenoidal, temporal and mastoid areas, and 27.9 per cent, in the posterior third. The middle third fractures were most easily missed.—*Radiology*, 41:532, December 1943.

S. J. FANALE.

Fractures of the Mandible

K. M. BROESAMLE

THE author, believing that rigid fixation of the lower jaw against the upper is not necessary, considers that intermaxillary elastic traction is the method of choice and that some motion is actually beneficial. A series of 188 fractures were treated. The Gilmer and Ivy methods were used for direct fixation. The ease and speed of application of multiple loop wiring make it a satisfactory method. There is no tooth movement. It is easy to keep the appliances clean. The material of preference is 30-gage stainless steel wire, which is best manipulated with instruments. Sulfa therapy is an important aid.—*U. S. Nav. M. Bull.*, 42:47, January 1944.

S. J. FANALE.

What the General Practitioner Should Know About the Chemotherapy of Bacterial Infections

E. E. OSGOOD

THE use of sulfonamides is indicated when bacterial diagnosis shows that the causative organisms are susceptible to their action. Early institution of sulfonamides in acute bacteremia, etc., is of great help. Wherever accessible local aggregations of pyogenic organisms are found, local sulfa therapy is of value. The drugs are ineffective in the majority of virus infections. In selection of a sulfa compound, consideration should be given to the effectiveness of a drug or combination of drugs which, when administered, will give equally effective concentrations at the site of the infection. At the same time, its use should involve the least danger of causing serious toxicity. Sulfathiazole is the drug of choice for local and systemic use against the vast majority of bacterial infections in which chemotherapy is indicated. If drug toxicity develops, sulfadiazine can be substituted. Equally effective blood concentrations are sulfathiazole 4-8 mg. per hundred cubic centimeters, sulfadiazine 16-32, sulfapyridine 8-16 and sulfanilamide 25-70. Most deaths from complications can be avoided if the untoward signs are detected early and the proper precautions are taken. Between 5 and 15 per cent of adequately treated patients develop one or another of the less serious toxic manifestations, such as nausea, vomiting, dermatitis, drug fever or mental confusion.—*Canad. M. A. J.*, 50:1, January 1944.

S. J. FANALE.

Vitamin Status on West Coast of Newfoundland

ELLEN MCDEVITT ET AL.

A SURVEY carried out to determine the effects of prolonged deprivation of normal dietary vitamin intake upon a West Coast Newfoundland population consistently revealed the clinical signs of dental caries, gingivitis and hyperkeratosis. The diet, high in fat and refined carbohydrates and moderately high in protein, was deficient in protective foods. One of the chief complaints of woodmen and fishermen was dental caries.

In 223 cases (72 per cent of the group in the survey), symptoms of vitamin B complex deficiency were seen, including ocular, gastro-intestinal, cardiac, neurologic and constitutional disturbances. Cheilosis, swelling, soreness, denudation and discoloration of the tongue were seen in forty-eight cases.

Vitamin C levels in the blood were within normal limits only two months of the year (September and October). The authors suggest that the low vitamin C diets should be considered to be contributory to the widespread presence of dental caries, but do not consider the widespread use of refined white flours, sugars, salted fish and meat and canned foods and lack of leafy green vegetables and dairy products. Lack of the latter foods accounts for the numerous B complex deficiencies.—*Ann. Int. Med.*, 20: 1, January 1944.

PAUL H. KEYES.

Analgesic, Bactericidal and Hemostatic Compositions Suitable for Use in Oral Surgery

N. M. MOLNAR

A SOLUTION made of chlorobutanol, sulfanilamide and tannic acid, in a solvent mixture of alcohol, glycerol and water, is reported to be stable over a wide temperature range.—*Chem. Abst.*, 38:1, January 1944.

PAUL H. KEYES.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

AMERICAN ASSOCIATION OF DENTAL SCHOOLS, Chicago, Ill., March 20-22.

AMERICAN ASSOCIATION OF ORTHODONTISTS, Chicago, Ill., April 25-27.

AMERICAN BOARD OF ORTHODONTICS, Chicago, April 23-24.

AMERICAN DENTAL ASSISTANTS ASSOCIATION, Omaha, Nebr., October 9-12.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY, New York, N. Y., March 27.

CLEVELAND DENTAL SOCIETY, May 8-10.

DISTRICT OF COLUMBIA DENTAL SOCIETY, second Tuesday in each month, at the Medical Society Auditorium, Washington.

THOMAS P. HINMAN MID-WINTER CLINIC, Atlanta, Ga., March 26-28.

INTERNATIONAL ASSOCIATION OF DENTAL RESEARCH, Chicago, Ill., March 18-19.

KANSAS STATE DENTAL ASSISTANTS' ASSOCIATION, Topeka, May 3-4.

NATIONAL BOARD OF DENTAL EXAMINERS, May 1-2.

NEW YORK SOCIETY OF ORTHODONTISTS, New York, March 6-7.

ONTARIO DENTAL ASSOCIATION, Toronto, Canada, May 29-31.

SOUTHWESTERN SOCIETY OF ORTHODONTISTS, Shreveport, La., February 28-March 2.

STATE SOCIETIES

March

Minnesota, at St. Paul (1-3)
Wisconsin, at Milwaukee (20-22)

April

Alabama, at Birmingham (10-13)
Kentucky, at Louisville (3-5)
Louisiana, at Shreveport (13-15)
Michigan, at Detroit (17-19)
Mississippi, at Jackson (23-25)
Missouri, at Jefferson City (24-26)
Oklahoma, at Tulsa (16-19)
South Carolina, at Columbia (24-25)
Virginia, at Richmond (3-5)

May

Connecticut, at New Haven (26-27)
Georgia, at Atlanta (7-10)
Illinois, at Springfield (8-11)
Kansas, at Topeka (3-4)
Maryland, at Baltimore (1-2)
Montana, at Billings (4-6)
New Jersey, at Atlantic City (3-5)
New York, at Buffalo (9-12)
North Carolina, at Raleigh (1-3)
Tennessee, at Memphis (22-25)

STATE BOARDS OF DENTAL EXAMINERS

Indiana, at Indianapolis, April 24-27. Carl A. Frech, Gary National Bank Bldg., Gary, Secretary.

Iowa, at Iowa City, April 17-21. Harry G. Bolks, Badgerow Bldg., Sioux City, Secretary.

Maine, at Augusta, March 16-18. Carl W. Maxfield, 31 Central St., Bangor, Secretary.

North Carolina, at Raleigh, September 25. Wilbert Jackson, Rich Bldg., Clinton, Secretary.

North Dakota, at Fargo, July 10-13. R. A. Andrews, Carrington, Secretary.

Ohio, at Columbus, practical examination, February 28-March 1 (dental); theory (dental and dental hygiene), March 2-4. Earl D. Lowry, 79 E. State St., Columbus 15, Secretary.

Vermont, at Montpelier, June 26-28. Charles I. Taggart, 139 Bank St., Burlington, Secretary.

West Virginia, at West Liberty, June 26-28 (dental and dental hygiene). R. H. Davis, Goff Bldg., Clarksburg, Secretary.

AMERICAN ASSOCIATION OF DENTAL SCHOOLS

THE annual meeting of the American Association of Dental Schools will be held

March 20-22 at the Drake Hotel, Chicago, Ill.

CARL O. FLAGSTAD, *Secretary,*
University of Minnesota,
School of Dentistry,
Minneapolis.

AMERICAN ASSOCIATION OF ORTHODONTISTS

THE next meeting of the American Association of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., April 25, 26, 27. Members of the American Dental Association are invited to attend this meeting upon the presentation of proper credentials and payment of the registration fee. Credentials should be obtained in advance from the secretary of the American Association of Orthodontists or the secretary of a constituent orthodontic society.

MAX E. ERNST, *Secretary,*
1250 Lowry Medical Arts Building,
St. Paul 2, Minn.

AMERICAN ASSOCIATION OF ORTHODONTISTS RESEARCH SECTION

AT the present time, there is no opportunity afforded men interested in orthodontic research to meet to discuss their problems. At the last meeting of the American Association of Orthodontists, it was proposed that the Research Committee be empowered to arrange a portion of the program for the next annual meeting, to be held in Chicago, April 25-27.

The program will consume one-half day and will be restricted to ten or fifteen minute reports by men actively engaged in research in orthodontia or its allied fields. Time will be allowed for discussion of all presentations, in order that the greatest benefit may accrue to those participating. All institutions and all individuals are invited to request time.

For further information or time reservations on the program, address

ALLAN G. BRODIE, *Chairman,*
Research Committee, A. A. O.,
30 North Michigan Ave.,
Chicago, Ill.

AMERICAN BOARD OF ORTHODONTICS

THE 1944 meeting of the American Board of Orthodontics will be held at the Edgewater Beach Hotel, Chicago, Ill., April 23 and 24. Orthodontists who may desire to be certificated by the Board can obtain application blanks from the secretary, Bernard G. deVries, 705 Medical Arts Bldg., Minneapolis, Minn.

AMERICAN DENTAL ASSISTANTS ASSOCIATION

THE Twentieth Annual Session of the American Dental Assistants Association will be held in Omaha, Nebr., October 9-12. For further information, address

AILEEN M. FERGUSON,
General Secretary,
709 Centre St.,
Jamaica Plain, Mass.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY

THE Spring meeting of the American Society for the Advancement of General Anesthesia in Dentistry will be held Monday evening, March 27 at the National Republican Club, 54 W. 40th St., New York, N. Y. James R. Cameron, of Philadelphia, will preside. George F. Seeman, of Nashville, Tenn., will present a paper dealing with administration of anesthetics in dentistry. Members of the profession are invited.

M. HILLEL FELDMAN, *Secretary,*
730 Fifth Ave.,
New York, N. Y.

CLEVELAND DENTAL SOCIETY ANNUAL SPRING CLINIC MEETING

THE Annual Spring Clinic Meeting of the Cleveland Dental Society will be held at the Hotel Carter, May 8-10.

H. C. ALEXANDER,
Windermere Theatre Bldg.,
East Cleveland, Ohio.

DISTRICT OF COLUMBIA DENTAL SOCIETY

THE District of Columbia Dental Society holds its meetings on the second Tuesday of every month, at the Medical Society Auditorium, 1718 M. St., N.W., Washington.

J. WALTER BERNHARD, *Secretary,*
1835 Eye St., N.W.,
Washington.

THE THOMAS P. HINMAN MID-WINTER CLINIC

THE Thomas P. Hinman Mid-Winter Clinic will be held at the Municipal Auditorium, Atlanta, Georgia, March 26, 27, 28.

S. A. GARRETT, *Chairman,*
302 Medical Arts Building,
Atlanta, Ga.

INTERNATIONAL ASSOCIATION OF DENTAL RESEARCH

THE International Association of Dental Research will convene March 18-19 at the Drake Hotel, Chicago, Ill.

CARL O. FLAGSTAD, *Secretary,*
University of Minnesota,
School of Dentistry,
Minneapolis.

KANSAS STATE DENTAL ASSISTANTS' ASSOCIATION

THE annual meeting of the Kansas State Dental Assistants' Association will be held at the Jayhawk Hotel, Topeka, May 3-4.

ROBERTA GAWTHROP, *Secretary.*

NATIONAL BOARD OF DENTAL EXAMINERS

THE following are the dates for the next examinations of the National Board of Dental Examiners: May 1-2. Applications should be sent through deans.

GORDON L. TEALL, *Secretary.*

NEW YORK SOCIETY OF ORTHODONTISTS

THE annual or spring meeting of the New York Society of Orthodontists will be held at the Waldorf-Astoria Hotel, New York, March 6-7.

NORMAN L. HILLYER, *Secretary,*
Professional Bldg.,
Hempstead.

ONTARIO DENTAL ASSOCIATION

THE Seventy-Seventh Annual Convention of the Ontario Dental Association will be held at the Royal York Hotel, Toronto, May 29-31. Dentists from the United States and all parts of Canada will be welcome.

EDMUND A. GRANT, *Secretary,*
86 Bloor St. West,
Toronto, Canada.

SOUTHWESTERN SOCIETY OF ORTHODONTISTS

THE Twenty-Fourth Annual Meeting of the Southwestern Society of Orthodontists will be held in Shreveport, La., February 28-March 2, at the Washington-Youree Hotel.

JAMES O. BAILEY, *Secretary,*
Hamilton Bldg.,
Wichita Falls, Texas.

ALABAMA DENTAL ASSOCIATION

THE annual meeting of the Alabama Dental Association will be held at the Tutwiler Hotel in Birmingham, April 10-13.

PRYOR A. WILLIAMS, *Secretary,*
1005 Protective Life Bldg.,
Birmingham.

CONNECTICUT STATE DENTAL ASSOCIATION

THE Eightieth Annual Meeting of the Connecticut State Dental Association will be held at the Hotel Taft, New Haven, May 26-27.

EARLE S. ARNOLD, *Secretary,*
37 Linnard Road,
West Hartford 7.

GEORGIA DENTAL ASSOCIATION

THE seventy-sixth annual meeting of the Georgia Dental Association will be held in Atlanta, May 7-10, with headquarters at the Ansley Hotel.

R. H. MURPHY, *Secretary,*
605 Bankers Insurance Bldg.,
Macon.

ILLINOIS STATE DENTAL SOCIETY

THE next meeting of the Illinois State Dental Society will be held in Springfield, May 8-11.

L. H. JACOB, *Secretary,*
Jefferson Bldg.,
Peoria 2.

KANSAS STATE DENTAL ASSOCIATION

THE Seventy-Third Annual Session of the Kansas State Dental Association will be held at the Hotel Kansan, Topeka, May 3-4.

FRED A. RICHMOND, *Secretary,*
Huron Bldg.,
Kansas City.

KENTUCKY STATE DENTAL ASSOCIATION

THE eighty-fourth annual meeting of the Kentucky State Dental Association will be held at the Brown Hotel, Louisville, April 3-5.

J. L. WALKER, *Secretary,*
640 Barbee Way South,
Louisville.

LOUISIANA STATE DENTAL SOCIETY

THE next meeting of the Louisiana State Dental Society will be held April 13-15, at the Washington-Youree Hotel, Shreveport.

MARYLAND STATE DENTAL ASSOCIATION

THE Sixty-First Annual Meeting of the Maryland State Dental Association will be held in Baltimore, May 1-2, at the Belvedere Hotel.

PAUL A. DEEMS, *Secretary,*
835 Park Ave.,
Baltimore.

MICHIGAN STATE DENTAL SOCIETY

THE Eighty-Eighth Annual Meeting of the Michigan State Dental Society will be held at the Hotel Statler, Detroit, April 17-19.

S. G. APPLEGATE,
General Chairman,
630 E. Jefferson Ave.,
Detroit.

MINNESOTA STATE DENTAL ASSOCIATION

THE sixty-first annual session of the Minnesota State Dental Association will be held in the Municipal Auditorium, St. Paul, March 1-3. All members of the American Dental Association are invited to attend.

L. M. CRUTTENDEN, *Secretary,*
498 Lowry Bldg.,
St. Paul.

MISSISSIPPI DENTAL ASSOCIATION

THE Mississippi Dental Association will hold its sixty-ninth annual meeting at the Robert E. Lee Hotel, Jackson, April 23-25.

O. L. COLEE, *Secretary,*

MISSOURI STATE DENTAL ASSOCIATION

THE next meeting of the Missouri State Dental Association will be held at Jefferson City, April 24-26, at the Governor Hotel.

C. W. DIGGES, *Secretary,*
Exchange National Bank Bldg.,
Columbia.

MONTANA STATE DENTAL ASSOCIATION

THE 1944 meeting of the Montana State Dental Association will be held in Billings, May 4-6.

T. T. RIDER, *Secretary,*
9 Higgins Block,
Missoula.

NEW JERSEY STATE DENTAL SOCIETY

THE New Jersey State Dental Society will hold its seventy-fourth annual meeting May 3-5 at the Claridge Hotel, Atlantic City.

F. K. HEAZELTON, *Secretary,*
223 E. Hanover St.,
Trenton 8.

DENTAL SOCIETY OF THE STATE OF NEW YORK

THE Seventy-Sixth Annual Meeting of the Dental Society of the State of New York will be held in Buffalo, at the Hotel Statler, May 9-12.

PERCY T. PHILLIPS,
Press and Publication Committee,
18 E. 48th St.,
New York 17.

NORTH CAROLINA DENTAL SOCIETY

THE Seventieth Annual Meeting of the North Carolina Dental Society will be held at the Hotel Sir Walter Raleigh, May 1-3.

E. M. MEDLIN, *Secretary,*
Aberdeen.

OKLAHOMA STATE DENTAL SOCIETY

THE next meeting of the Oklahoma State Dental Society will be held April 16-19 at the Mayo Hotel, Tulsa.

EUGENE W. WISE,
Medical Arts Bldg.,
Tulsa.

SOUTH CAROLINA STATE DENTAL ASSOCIATION

THE next meeting of the South Carolina State Dental Association will be held at the Columbia Hotel, Columbia, April 24-25.

L. E. DELLINGER, *President,*
Greenville.

TENNESSEE STATE DENTAL ASSOCIATION

THE next annual meeting of the Tennessee State Dental Association will be held at the Hotel Peabody, Memphis, May 22-25.

E. JEFF JUSTIS, *Secretary,*
1504 Exchange Bldg.,
Memphis.

VIRGINIA STATE DENTAL ASSOCIATION

THE Virginia State Dental Association will hold its next annual meeting April 3-5, at the John Marshall Hotel, Richmond.

J. E. JOHN, *Secretary,*
Medical Arts Bldg.,
Roanoke.

WISCONSIN STATE DENTAL SOCIETY

THE Wisconsin State Dental Society will hold its seventy-fourth annual convention at the Hotel Schroeder, Milwaukee, March 20-22. A meeting of the executive council and house of delegates will precede the general convention March 19.

KENNETH F. CRANE, *Secretary,*
1233 Bankers Bldg.,
Milwaukee.

INDIANA STATE BOARD OF DENTAL EXAMINERS

THE Indiana State Board of Dental Examiners will hold its next examination in Indianapolis, April 24-27. All credentials and fees must be filed with the secretary at least two weeks prior to the examination.

CARL A. FRECH, *Secretary,*
Gary Nat'l Bank Bldg.,
Gary.

IOWA STATE BOARD OF DENTAL EXAMINERS

THE Iowa State Board of Dental Examiners will hold its next examination at the College of Dentistry, State University of Iowa, Iowa City, April 17-21. Application with necessary fee must be in the hands of Mr. H. W. Grefe, director of Licensure and Registration, Iowa State Department of Health, Des Moines, fifteen days before the examination.

HARRY G. BOLKS, *Secretary,*
Badgerow Bldg.,
Sioux City.

MAINE STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the State Board of Dental Examiners of Maine will be held March 16-18 at the State House, Augusta. Applications with necessary fee must be in the hands of the secretary at least ten days before the date of the examination. Address all communications to

CARL W. MAXFIELD, *Secretary,*
31 Central St.,
Bangor.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the North Carolina State Board of Dental Examiners for the examination of applicants for licensure will be held at the State Capitol, Raleigh, beginning September 25. Applications must be filed with the secretary thirty days before the examination. For application blanks and further information, address

WILBERT JACKSON, *Secretary,*
Rich Bldg.,
Clinton.

NORTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

THE North Dakota State Board of Dental Examiners will hold its next examination at the Gardner Hotel, Fargo, July 10-13. Applications should be in the hands of the secretary ten days earlier. For further information and application, address

R. A. ANDREWS, *Secretary,*
Carrington.

OHIO STATE DENTAL BOARD

THE next practical examination of the Ohio State Dental Board will be held at Ohio State University College of Dentistry, Columbus, February 28-March 1. The theory examination for both dental and dental hy-

giene applicants will be held in Columbus, March 2-4. Applications for these examinations must be in the hands of the secretary not later than February 18 and no application will be accepted after that date. For further information, apply to

EARL D. LOWRY, *Secretary,*
79 E. State St.,
Columbus 15.

STATE OF VERMONT BOARD OF DENTAL EXAMINERS

THE Vermont State Board of Dental Examiners will meet at the State House, Montpelier, June 26-28, for the purpose of examining candidates for license to practice in the State of Vermont. Address all inquiries to

CHARLES I. TAGGART, *Secretary,*
139 Bank St.,
Burlington.

WEST VIRGINIA STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the West Virginia State Board of Dental Examiners will be held at West Liberty State College, West Liberty, June 26-28. Examinations for licensure of dentists and dental hygienists will be held. All applications must be in the office of the secretary by June 16.

R. H. DAVIS, *Secretary,*
Goff Bldg.,
Clarksburg.

PAN AMERICAN ODONTOLOGICAL ASSOCIATION SCHOLARSHIP

THE Pan American Odontological Association takes pleasure in announcing an annual scholarship at the Tufts College Dental School, Boston, Mass., for graduate dentists from any of the Latin American countries. The subjects of study include: complete denture prosthesis, partial denture prosthesis, minor oral surgery, operative dentistry, ceramics, children's dentistry, root surgery and radiology, preventive dentistry and treatment of parodontal diseases.

This annual scholarship is an addition to the already available Pan American Odontological Association scholarships at the New York University, College of Dentistry; Evans Dental Institute, School of Dentistry, University of Pennsylvania, and the W. K. Kellogg Foundation Institute, Graduate and Postgraduate Dentistry, University of Michigan.

RALPH HOWARD BRODSKY, D.M.D.,
Executive Secretary,
14 East 81st St.,
New York 28, N. Y.

VOLUNTEERSHIPS AND EXTERNSHIPS, BRONX HOSPITAL

THERE are several volunteerships and externships available for recent graduates at the dental clinic, Bronx Hospital, in the following departments: oral surgery and exodontia, operative dentistry, orthodontia, surgical periodontia and root canal therapy. Applicants address David Wurzel, director of the Dental Department, Bronx Hospital, 169th St. & Fulton Ave., Bronx, New York.

DENTAL INTERNSHIPS

Two internships are available at the St. Louis City Hospital for recent dental graduates. Opportunity is afforded for training and experience in dental and oral surgery, diagnosis and other phases of dentistry. Applicants should address Leo J. Wade, Medical Director, or Hamilton B. G. Robinson, D.D.S., City Hospital, 1515 Lafayette Ave., St. Louis, Mo.

DENTAL INTERNSHIPS

THE Greater New York Conference of Hospital Dental Services, comprised of a group of men who are chiefs of dental services, would like to aid those men seeking dental internships in hospitals in the metropolitan area. Those who are not in the Army or the Navy and who are desirous of obtaining internships should communicate with

MARY E. REILLY, *Secretary,*
386 Fourth Ave.,
New York, N. Y.

DENTAL INTERNSHIP

AN internship is available to a recent dental graduate at the Research and Educational Hospital of the University of Illinois Medical Center. An unusual opportunity is afforded for training and experience in hospital dentistry and the medical aspects of dental disease. Application forms can be

obtained from the Dean, University of Illinois College of Dentistry, 808 South Wood St., Chicago 12, Ill.

DENTAL EXTERNSHIPS

VOLUNTEER dental externships are available in the Research and Educational Hospital to dental practitioners desiring training and experience in hospital dentistry, dentistry for children and the dental aspects of systemic disease. Applications forms can be obtained from the Dean, University of Illinois College of Dentistry, 808 South Wood St., Chicago 12, Ill.

UNIVERSITY OF CALIFORNIA RESEARCH ASSISTANT

THE College of Dentistry, University of California has an appointment as research assistant available for a qualified person beginning June 30. The appointment is in the Division of Dental Medicine and is for one year. This may be extended for an additional year.

This appointment is designed primarily for dental graduates with an interest in dental research and teaching. However, this dental degree requirement can be waived if other qualifications justify it.

The basic salary is $1,500 a year, plus an emergency increase to care for added living costs.

Application forms can be obtained from the Dean of the College of Dentistry, University of California, San Francisco, Calif.

WILLARD C. FLEMING, *Dean.*

UNIVERSITY OF ILLINOIS RESEARCH FELLOWSHIPS

APPLICATIONS for Research Fellowships in Medicine, Dentistry and Pharmacy in the University of Illinois are now being considered for the year beginning September 1, 1944. Appointments to these Fellowships will be announced January 1.

Candidates for these Fellowships must have completed a training of not less than eight years beyond high school graduation. The Fellowship carries a stipend of $1,200 per calendar year with one month's vacation.

Application blanks and further information can be secured from the secretary of the Committee on Graduate Work in Medicine, Dentistry and Pharmacy, 1853 West Polk St., Chicago 12, Ill.

CARNEGIE FELLOWSHIPS FOR RESEARCH AND GRADUATE WORK IN THE DENTAL SCIENCES

AIDED by the Carnegie Corporation of the New York and the Eastman Dental Clinic, the School of Medicine and Dentistry of the University of Rochester offers scholarships paying $1,200-$1,800 per annum to well-trained dental graduates who are interested in research or who desire special training in the basic medical sciences as an aid to dental teaching or practice. A few fellowships also offer part-time training in oral surgery. On appointment, the applicant is given the title of Fellow in Dentistry and, according to his interests, works as a graduate student in one of the departments of the medical schools. Here, excellent laboratory facilities, adequate direction and close contact with various investigations related to medicine and dentistry help his research and study. Fellows are encouraged to attend medical classes, seminars and staff meetings and, when opportunity presents itself, to participate in class instruction and scientific meetings. Contact with the problems of clinical dentistry may be maintained through the Oral Surgery Clinic of the Strong Memorial Hospital and the Rochester Dental Dispensary. With the approval of the Graduates Council of the university, Fellows may prepare themselves for the degree of M.S. or Ph.D. Applications should be made to

GEORGE H. WHIPPLE, *Dean,*
Rochester, N. Y.

OHIO STATE UNIVERSITY POSTGRADUATE COURSES IN DENTISTRY

THE College of Dentistry of the Ohio State University, at Columbus, offers postgraduate courses in dentistry that are especially designed for the general practitioner who may wish to amplify his training in any of the following fields: oral surgery, prosthodontia, radiology, crown and bridgework, operative dentistry and root-canal therapy. The length and dates of the courses are as follows:

Oral surgery	June 12 to 16

Prosthodontia	June 12 to 17
Crown and bridge	June 12 to 16
Operative dentistry	June 12 to 16
Root canal therapy	June 12 to 16
Radiology	June 19 to 23

The fees for these courses will be $50 a week, with the registration limited to ten in each course, with the exception of prosthodontia, which will be $100 for the week's course, with registration limited to five.

It is the aim of these courses to teach new technics as well as to review the fundamentals. Further information and application blanks can be secured from the office of the dean, College of Dentistry, Ohio State University, Columbus.

FEDERAL POSITIONS FOR DENTAL HYGIENISTS

THE United States Civil Service Commission is continuing to recruit dental hygienists for federal positions. Experience is no longer necessary. Completion of a full course leading to graduation from a recognized school of oral hygiene and registration as a dental or oral hygienist in a state, territory or the District of Columbia will qualify applicants. Students enrolled in schools of oral hygiene may apply for federal positions when they are within nine months of completion of the course and may enter on duty on completion and registration. There are no age limits for the positions and no written tests. Appointees receive $1,970 a year entrance salary, which incorporates compensation for the eight hours of overtime included in the present forty-eight hour federal work week. The majority of positions are in Army hospitals and dispensaries throughout the country, particularly in the West and Southwest. Vacancies may occur also in the Veterans' Administration and the Public Health Service. Applications should be filed with the Civil Service Commission, Washington, 25, D. C.

W. C. HULL, *Executive Assistant,*
United States Civil Service Commission,
Washington, D. C.

UNITED STATES PATENTS APPLICABLE OR PERTAINING TO DENTISTRY ISSUED DURING JANUARY 1944

January 4

2,338,437, KARL AXEL SAM KARLSTROM. Dental instrument for boring, grinding, and like operations.

2,338,560, HARRY G. YARUSS. Centrifugal casting apparatus.

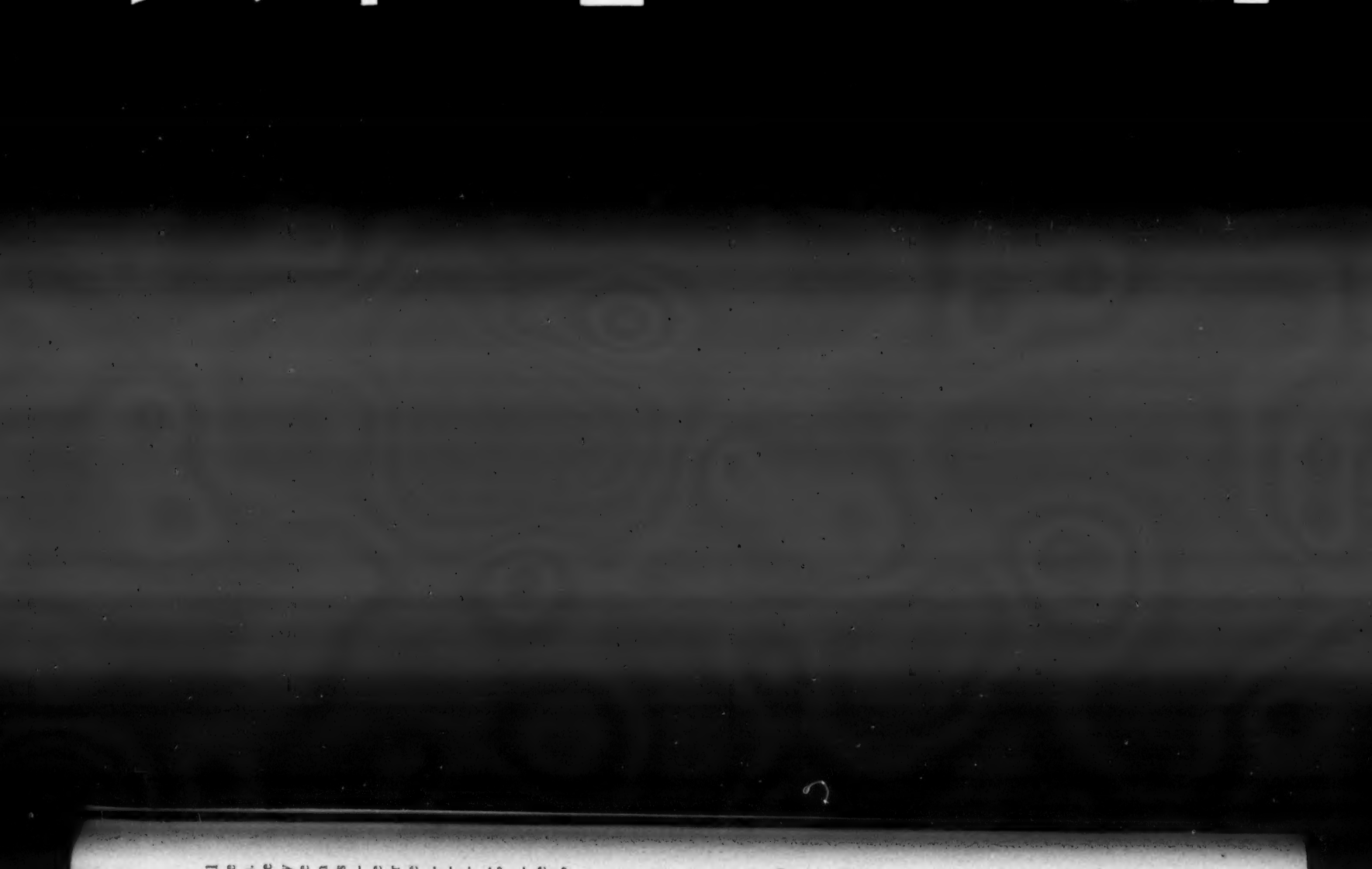
January 11

2,338,800, F. VINCENT BURKE. Locking guide on syringe needles.

2,339,092, HENRY E. MELTZER. Amalgam mixing machine.

January 18

2,339,674, FRIEDRICH L. BRECHT. Dental bridge lock.

January 25

No Dental Patents Issued